This product utilizes **R-454B** *refrigerant*

VersaPro® & Hyper Heat Central Ducted

CONDENSER SERVICE MANUAL

MODELS:

MVP-**-HP-C-230A00-O
CENTRAL-**-HP-C-230B00-O

Read this manual carefully before installation and keep it where the operator can easily find it for future reference.

Due to updates and constantly improving performance, the information and instructions within this manual are subject to change without notice.

Version Date: March 10, 2025
Please visit www.mrcool.com/documentation to ensure you have the latest version of this manual.

MRCOOL®
COMFORT MADE SIMPLE

CONTENTS

1.1 Model Reference

Outdoor Unit Model	Capacity (Btu/h)	Power Supply
MVP-18-HP-C-230A00-O	18K Regular Heat	1 Phase, 208/230V~, 60Hz
MVP-24-HP-C-230A00-O	24K Regular Heat	
MVP-30-HP-C-230A00-O	30K Regular Heat	
MVP-36-HP-C-230A00-O	36K Regular Heat	
MVP-48-HP-C-230A00-O	48K Regular Heat	
MVP-60-HP-C-230A00-O	60K Regular Heat	
CENTRAL-24-HP-C-230B00-O	24K Hyper Heat	
CENTRAL-30-HP-C-230B00-O	30K Hyper Heat	
CENTRAL-36-HP-C-230B00-O	36K Hyper Heat	
CENTRAL-48-HP-C-230B00-O	48K Hyper Heat	
CENTRAL-60-HP-C-230B00-O	60K Hyper Heat	

1.2 External Appearance

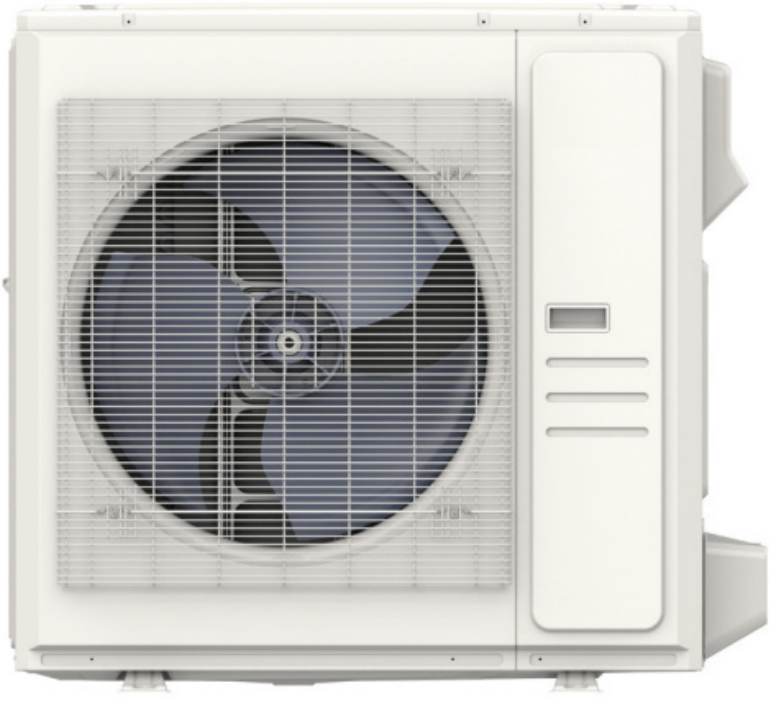
Outdoor Unit

MVP-18-HP-C-230A00-O

CENTRAL-24-HP-C-230B00-O/MVP-18-HP-C-230A00-O

CENTRAL-36-HP-C-230B00-O/MVP-36-HP-C-230A00-O

MVP-48-HP-C-230A00-O/ MVP-60-HP-C-230A00-O



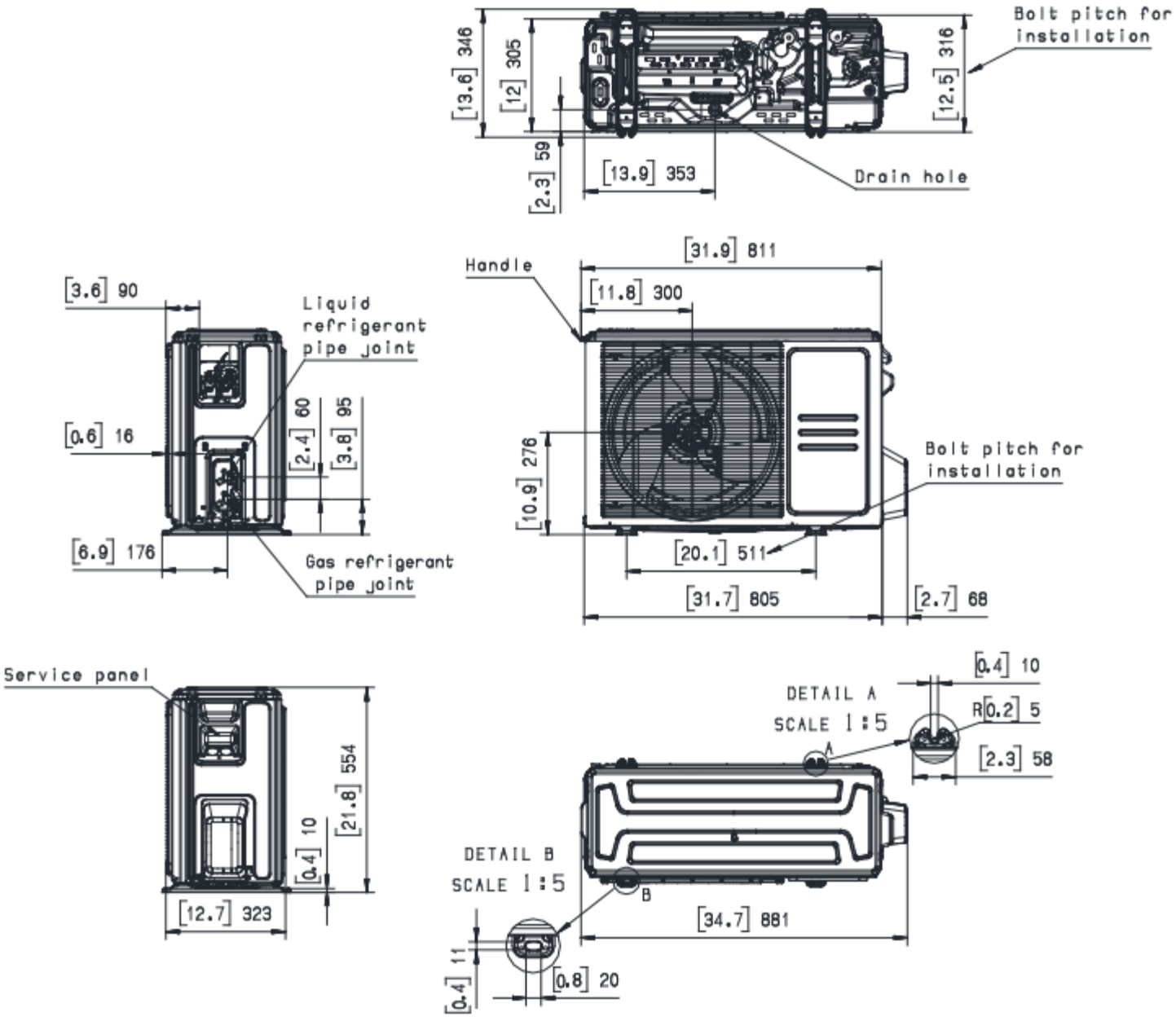
CENTRAL-60-HP-C-230B00-O

1.3 Dimensional Drawings

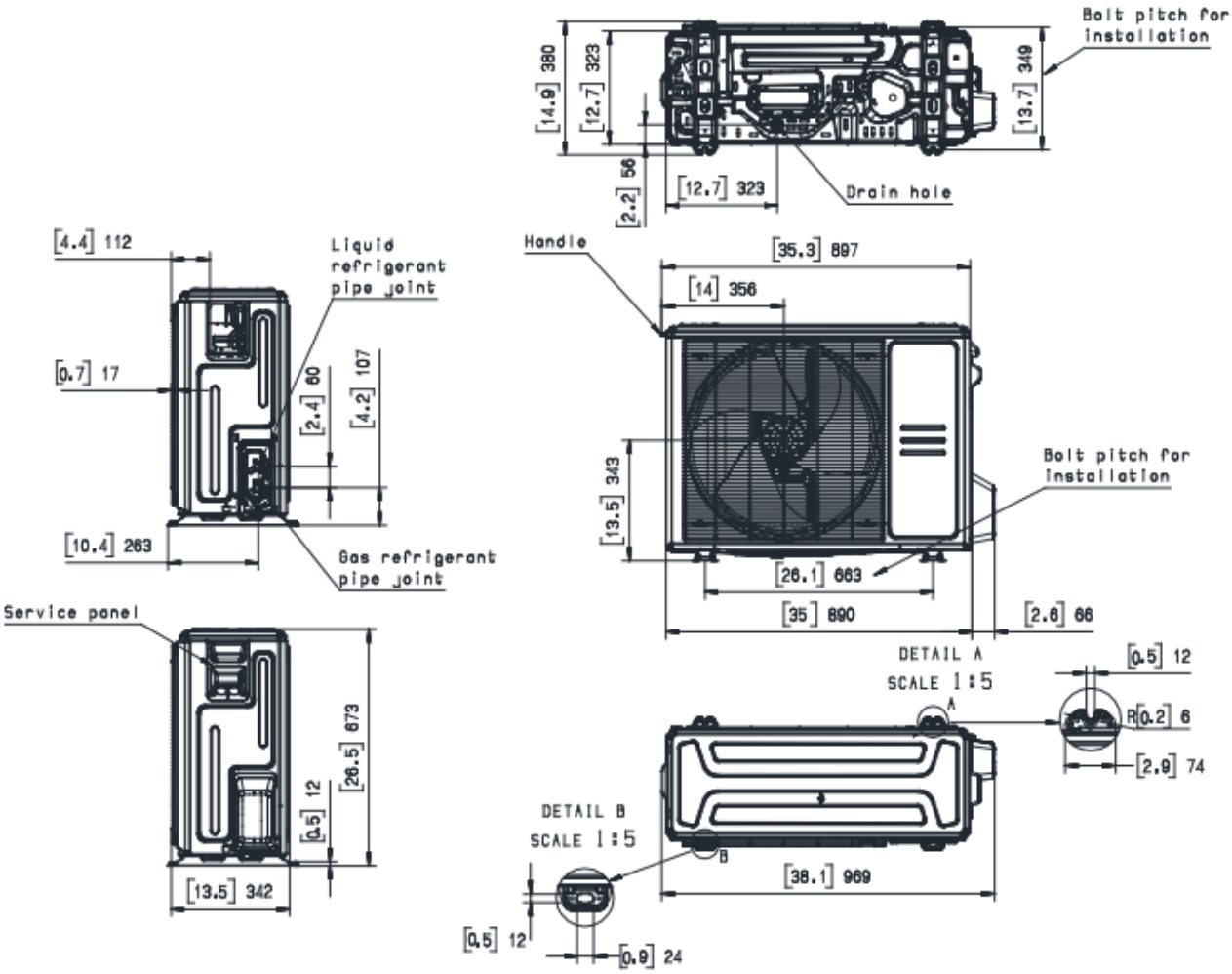
Note: Please check the corresponding dimensional drawing according to the panel plate.

Outdoor Unit Model	Platform
MVP-18-HP-C-230A00-O	X330
MVP-24-HP-C-230A00-O	X430
MVP-30-HP-C-230A00-O	D30
MVP-36-HP-C-230A00-O	D30
MVP-48-HP-C-230A00-O	X630
MVP-60-HP-C-230A00-O	X630
CENTRAL-24-HP-C-230B00-O	X430
CENTRAL-30-HP-C-230B00-O*1	D30
CENTRAL-36-HP-C-230B00-O	X630
CENTRAL-48-HP-C-230B00-O*2	X630
CENTRAL-60-HP-C-230B00-O	E30

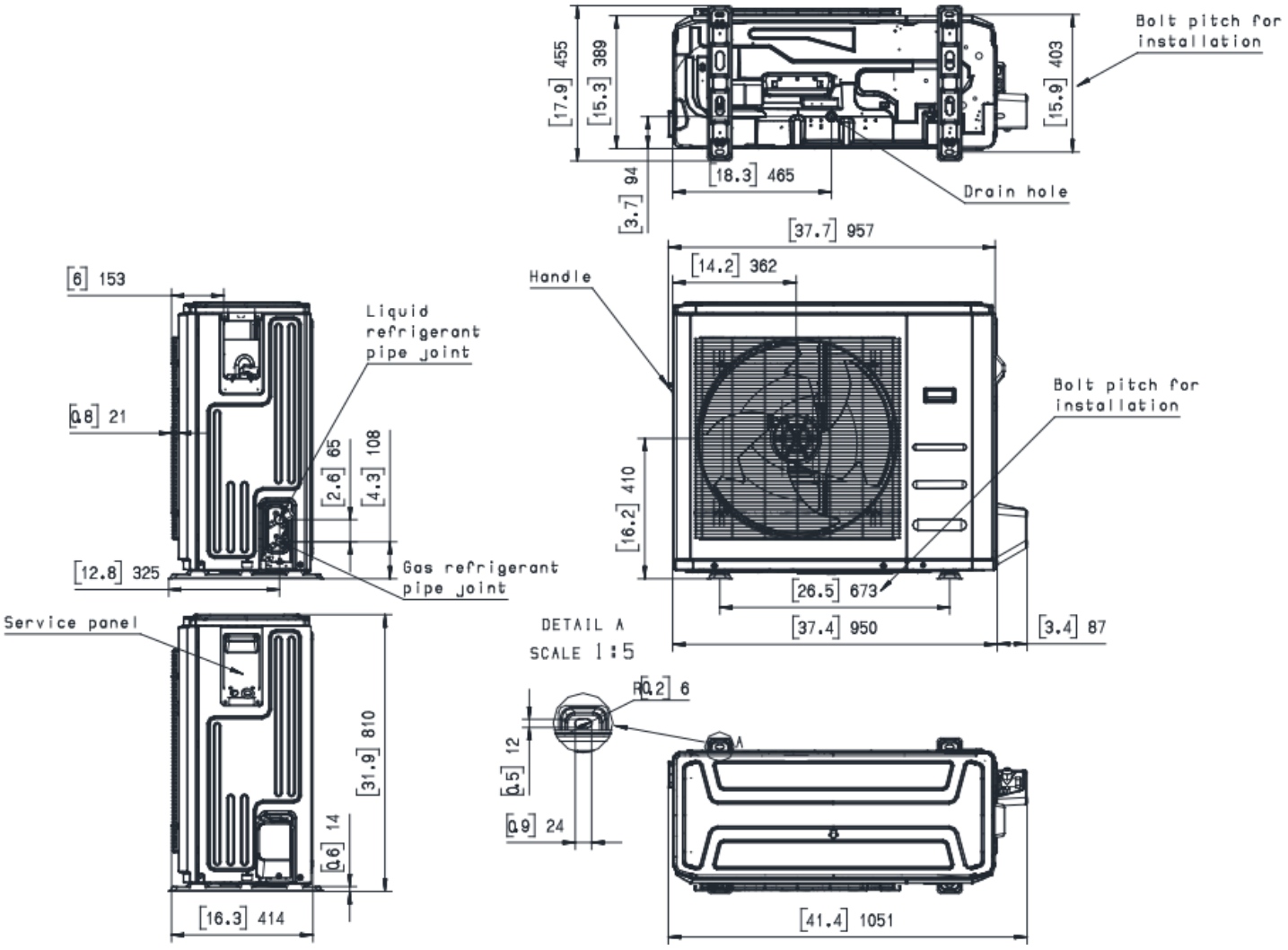
X330 Platform
MVP-18-HP-C-230A00-O



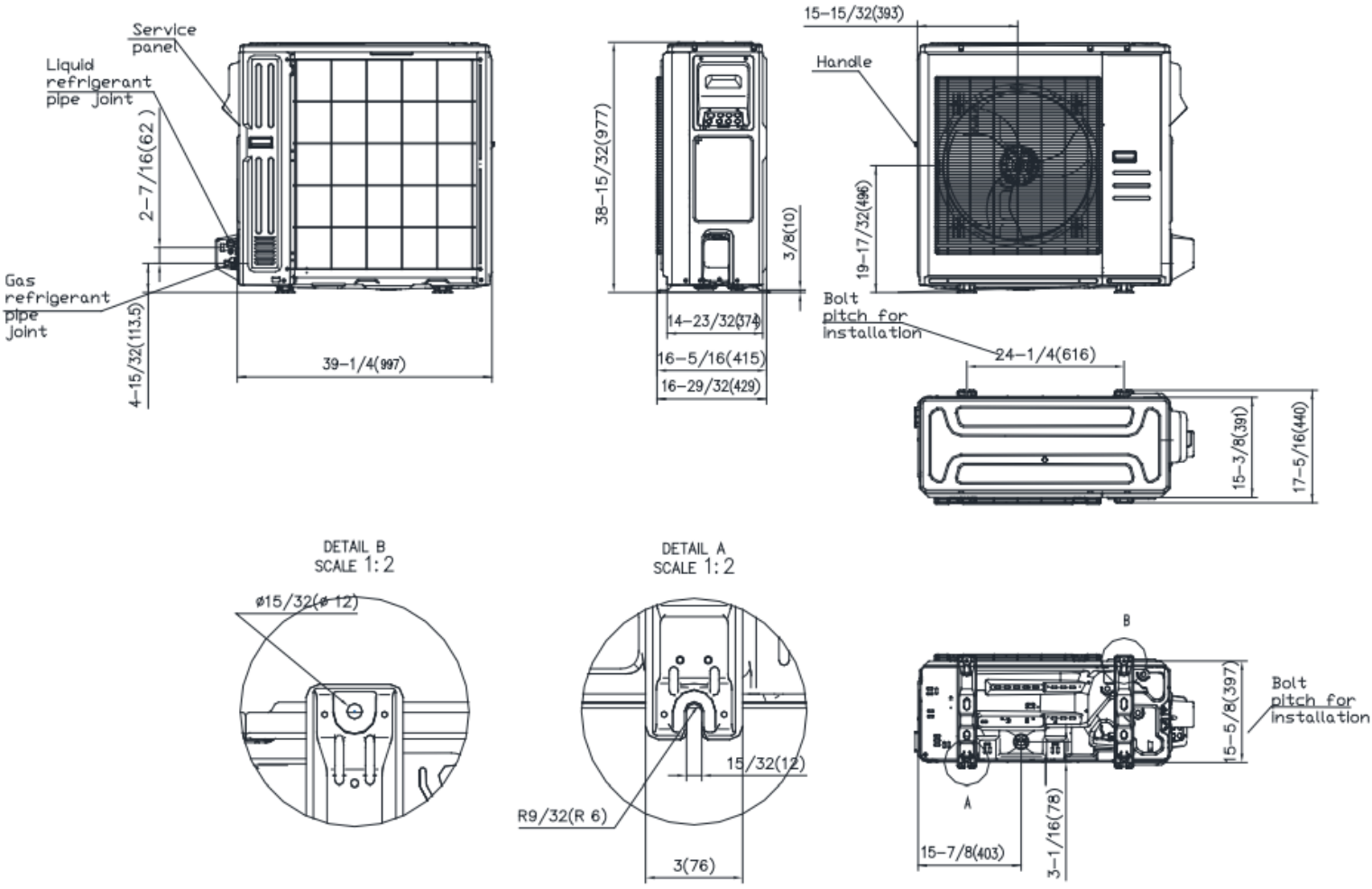
X430 Platform
MVP-24-HP-C-23000-O
CENTRAL-24-HP-C-230B00-O



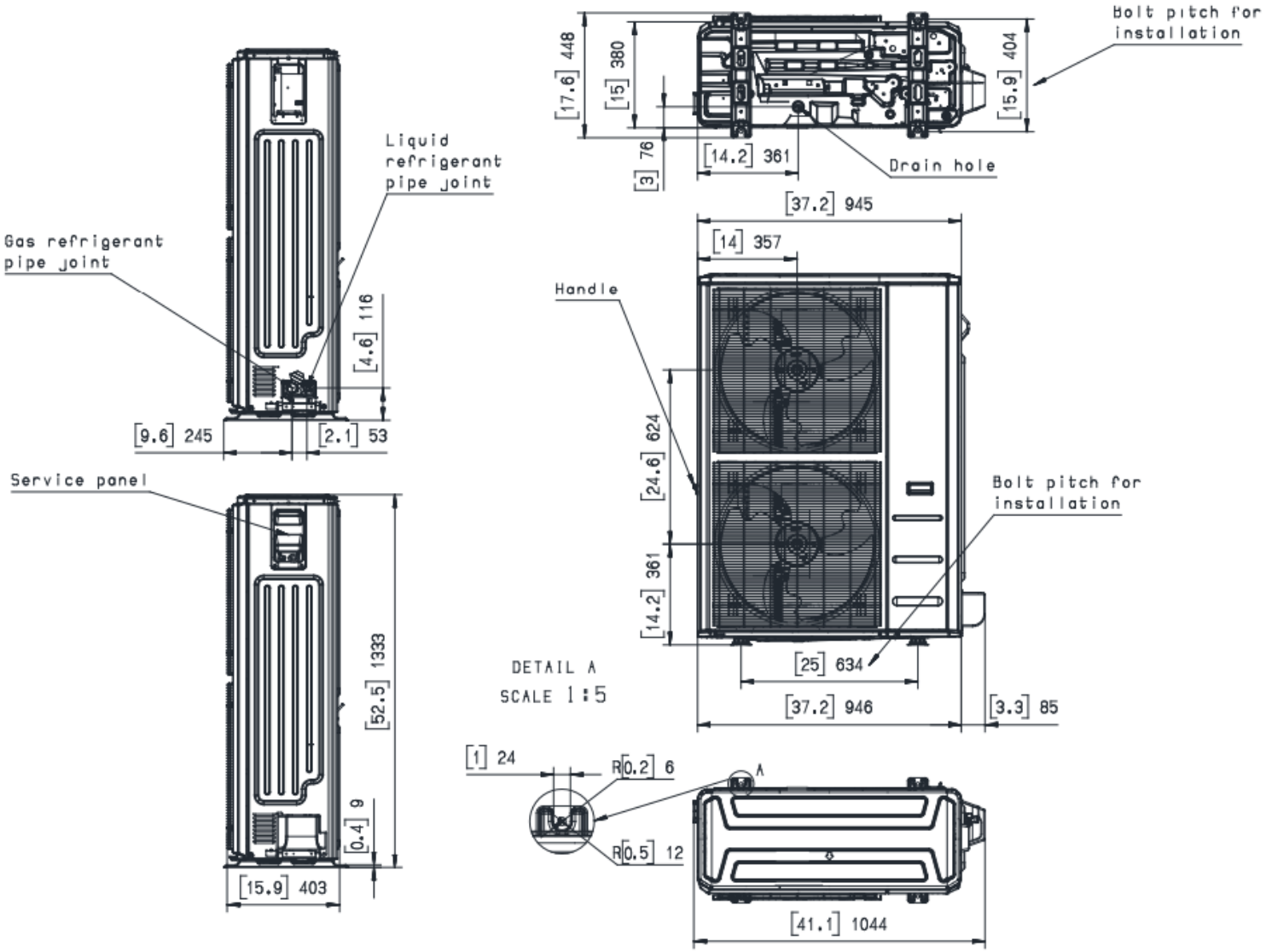
D30 Platform
MVP-30-HP-C-230A00-O
MVP-36-HP-C-230A00-O
CENTRAL-30-HP-C-230B00-O



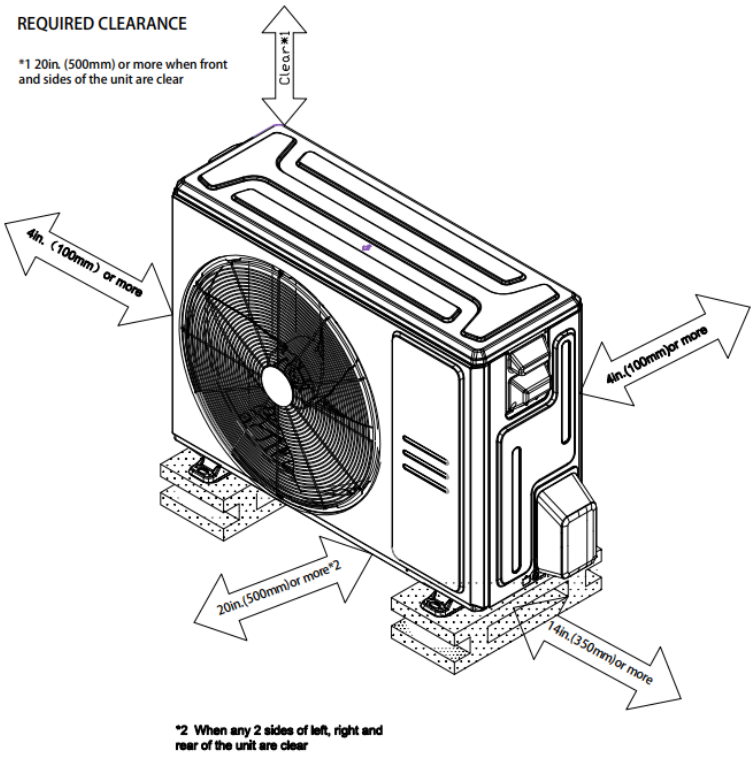
X630 Platform
MVP-48-HP-C-230A00-O
MVP-60-HP-C-230A00-O
CENTRAL-36-HP-C-230B00-O
CENTRAL-48-HP-C-230B00-O

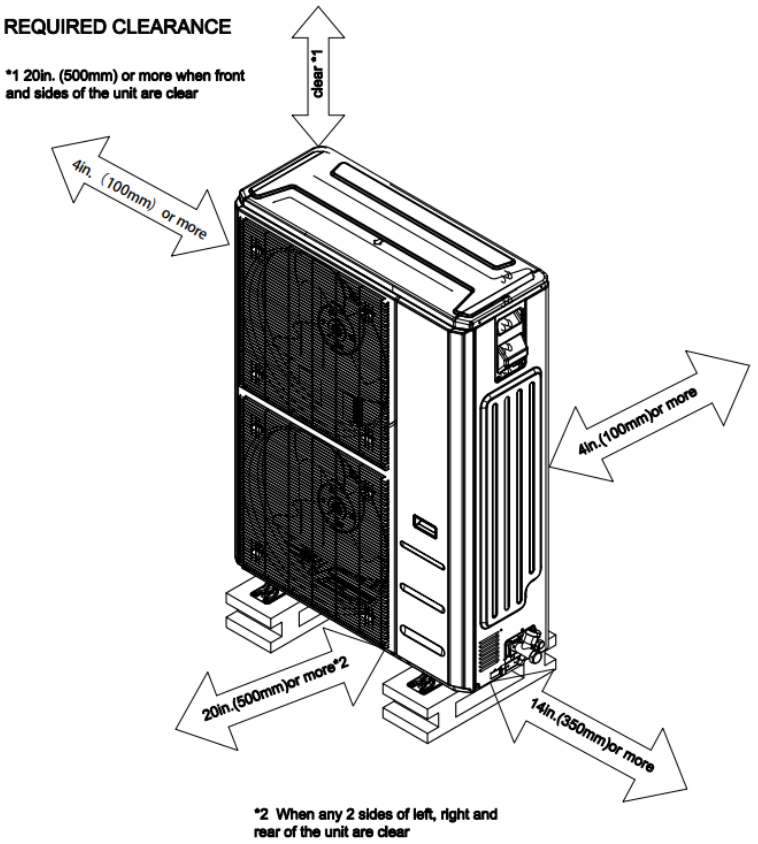


E30 Platform
CENTRAL-60-HP-C-230B00-O



1.4 Install Location





1.5 Capacity Correction Factor for Height Difference

Capacity (Btu/h)	18k		Pipe Length (Ft/m)			
Cooling			24.6/7.5	32.8/10	65.6/20	98.4/30
Height difference H (ft/m)	Indoor Higher than Outdoor	65.6/20			0.941	0.191
		32.8/10		0.974	0.951	0.928
		16.4/5	0.995	0.983	0.960	0.937
		0	1.000	0.988	0.965	0.942
	Outdoor Higher than Indoor	-16.4/-5	1.000	0.998	0.965	0.942
		-32.8/-10		0.988	0.965	0.942
		-65.6/-20			0.965	0.942
Heating			24.6/7.5	32.8/10	65.6/20	98.4/30
Height difference H (ft/m)	Indoor Higher than Outdoor	65.6/20			0.987	0.978
		32.8/10		0.966	0.987	0.978
		16.4/5	1.000	0.996	0.987	0.978
		0	1.00	0.996	0.987	0.978
	Outdoor Higher than Indoor	-16.4/-5	0.992	0.988	0.979	0.970
		-32.8/-10		0.980	0.971	0.962
		-65.6/-20			0.963	0.955

Capacity (Btu/h)	24K		Pipe Length (Ft/m)					
Cooling			24.6/7.5	32.8/10	65.6/20	98.4/30	131.2/40	164/50
Height difference H (ft/m)	Indoor Higher than Outdoor	82/25				0.917	0.898	0.879
		65.6/20			0.946	0.926	0.907	0.887
		32.8/10		0.975	0.955	0.936	0.916	0.896
		0	1.000	0.990	0.970	0.950	0.930	0.910
	Outdoor Higher than Indoor	-16.4/-5	1.000	0.990	0.970	0.950	0.930	0.910
		-32.8/-10		0.990	0.970	0.950	0.930	0.910
		-65.6/-20			0.970	0.950	0.930	0.910
		-82/-25				0.950	0.930	0.910
Heating			24.6/7.5	32.8/10	65.6/20	9834/30	131.2/40	164/50
Height difference H (ft/m)	Indoor Higher than Outdoor	82/25				0.984	0.978	0.972
		65.6/20			0.991	0.984	0.978	0.972
		32.8/10		0.997	0.991	0.984	0.978	0.972
		16.4/5	1.000	0.997	0.991	0.984	0.978	0.972
		0	1.000	0.997	0.991	0.984	0.978	0.972
	Outdoor Higher than Indoor	-16.4/-5	0.992	0.989	0.983	0.977	0.970	0.964
		-32.8/-10		0.981	0.975	0.969	0.963	0.957
		-65.6/-20			0.967	0.961	0.955	0.949
		-82/-25				0.953	0.947	0.941

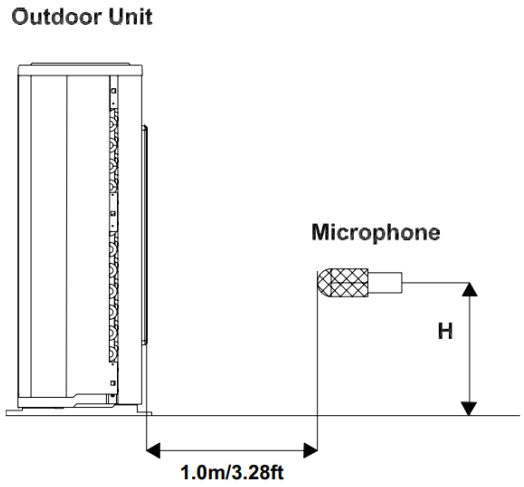
Capacity (Btu/h)	30K		Pipe Length (Ft/m)					
Cooling			24.6/7.5	32.8/10	65.6/20	98.4/30	131.2/40	164/50
Height difference H (ft/m)	Indoor Higher than Outdoor	82/25				0.891	0.862	0.832
		65.6/20			0.930	0.900	0.871	0.841
		32.8/10		0.970	0.940	0.910	0.879	0.849
		16.4/5	0.995	0.980	0.949	0.919	0.888	0.858
		0	1.000	0.985	0.954	0.923	0.893	0.862
	Outdoor Higher than Indoor	-16.4/-5	1.000	0.985	0.954	0.923	0.893	0.862
		-32.8/-10		0.985	0.954	0.923	0.893	0.862
		-65.6/-20			0.954	0.923	0.893	0.862
		-82/-25				0.923	0.893	0.862
Heating			24.6/7.5	32.8/10	65.6/20	98.4/30	131.2/40	164/50
Height difference H (ft/m)	Indoor Higher than Outdoor	82/25				0.961	0.945	0.929
		65.6/20			0.976	0.961	0.945	0.929
		32.8/10		0.992	0.976	0.961	0.945	0.929
		16.4/5	1.000	0.992	0.976	0.961	0.945	0.929
		0	1.000	0.992	0.976	0.961	0.945	0.929
	Outdoor Higher than Indoor	-16.4/-5	0.992	0.984	0.969	0.953	0.937	0.922
		-32.8/-10		0.976	0.961	0.945	0.930	0.914
		-65.6/-20			0.953	0.938	0.922	0.907
		-82/-25				0.930	0.915	0.900

Capacity (Btu/h)	36K		Pipe Length (Ft/m)					
Cooling			24.6/7.5	15/49.2	82/25	34/114.8	164/50	246/75
Height difference H (ft/m)	Indoor Higher than Outdoor	98.4/30				0.889	0.851	0.787
		65.6/20			0.924	0.898	0.859	0.795
		32.8/10		0.959	0.933	0.907	0.868	0.803
		16.4/5	0.995	0.969	0.942	0.916	0.876	0.811
		0	1.000	0.974	0.947	0.921	0.881	0.815
	Outdoor Higher than Indoor	-16.4/-5	1.000	0.974	0.947	0.921	0.881	0.815
		-32.8/-10		0.974	0.947	0.921	0.881	0.815
		-65.6/-20			0.947	0.921	0.881	0.815
		-30/-98.4				0.921	0.881	0.815
Heating			24.6/7.5	15/49.2	82/25	35/114.8	164/50	246/75
Height difference H (ft/m)	Indoor Higher than Outdoor	98.4/30				0.964	0.945	0.915
		65.6/20			0.976	0.964	0.945	0.915
		32.8/10		0.988	0.976	0.964	0.945	0.915
		16.4/5	1.000	0.988	0.976	0.964	0.945	0.915
		0	1.000	0.988	0.976	0.964	0.945	0.915
	Outdoor Higher than Indoor	-16.4/-5	0.992	0.980	0.968	0.956	0.938	0.908
		-35.8/-10		0.972	0.960	0.948	0.930	0.900
		-65.6/-20			0.952	0.941	0.923	0.893
		-30/-98.4				0.933	0.915	0.886

Capacity (Btu/h)	48K		Pipe Length (Ft/m)					
Cooling			24.6/7.5	15/49.2	82/25	34/114.8	164/50	246/75
Height difference H (ft/m)	Indoor Higher than Outdoor	98.4/30				0.884	0.843	0.775
		65.6/20			0.920	0.893	0.852	0.783
		32.8/10		0.957	0.930	0.902	0.860	0.791
		16.4/5	0.995	0.967	0.939	0.911	0.869	0.799
		0	1.000	0.972	0.944	0.916	0.873	0.803
	Outdoor Higher than Indoor	-16.4/-5	1.000	0.972	0.944	0.916	0.873	0.803
		-32.8/-10		0.972	0.944	0.916	0.873	0.803
		-65.6/-20			0.944	0.916	0.873	0.803
		-30/-98.4				0.916	0.873	0.803
Heating			24.6/7.5	15/49.2	82/25	35/114.8	164/50	246/75
Height difference H (ft/m)	Indoor Higher than Outdoor	98.4/30				0.958	0.936	0.901
		65.6/20			0.972	0.958	0.936	0.901
		32.8/10		0.986	0.972	0.958	0.936	0.901
		16.4/5	1.000	0.986	0.972	0.958	0.936	0.901
		0	1.000	0.986	0.972	0.958	0.936	0.901
	Outdoor Higher than Indoor	-16.4/-5	0.992	0.978	0.964	0.950	0.929	0.894
		-35.8/-10		0.970	0.956	0.942	0.921	0.887
		-65.6/-20			0.949	0.935	0.914	0.880
		-30/-98.4				0.927	0.907	0.873

Capacity (Btu/h)	60K		Pipe Length (Ft/m)					
Cooling			24.6/7.5	15/49.2	82/25	34/114.8	164/50	246/75
Height difference H (ft/m)	Indoor Higher than Outdoor	98.4/30				0.870	0.823	0.743
		65.6/20			0.911	0.879	0.831	0.751
		32.8/10		0.953	0.920	0.888	0.840	0.758
		16.4/5	0.955	0.962	0.930	0.897	0.848	0.766
		0	1.000	0.967	0.934	0.902	0.852	0.770
	Outdoor Higher than Indoor	-16.4/-5	1.000	0.967	0.934	0.902	0.852	0.770
		-32.8/-10		0.967	0.934	0.902	0.852	0.770
		-65.6/-20			0.934	0.902	0.852	0.770
		-30/-98.4				0.902	0.852	0.770
Heating			24.6/7.5	15/49.2	82/25	35/114.8	164/50	246/75
Height difference H (ft/m)	Indoor Higher than Outdoor	98.4/30				0.955	0.932	0.894
		65.6/20			0.970	0.955	0.932	0.894
		32.8/10		0.985	0.970	0.955	0.932	0.894
		16.4/5	1.000	0.985	0.970	0.955	0.932	0.894
		0	1.000	0.985	0.970	0.955	0.932	0.894
	Outdoor Higher than Indoor	-16.4/-5	0.992	0.977	0.962	0.947	0.924	0.887
		-35.8/-10		0.969	0.954	0.939	0.917	0.880
		-65.6/-20			0.947	0.932	0.910	0.873
		-30/-98.4				0.924	0.902	0.886

1.6 Noise Curves

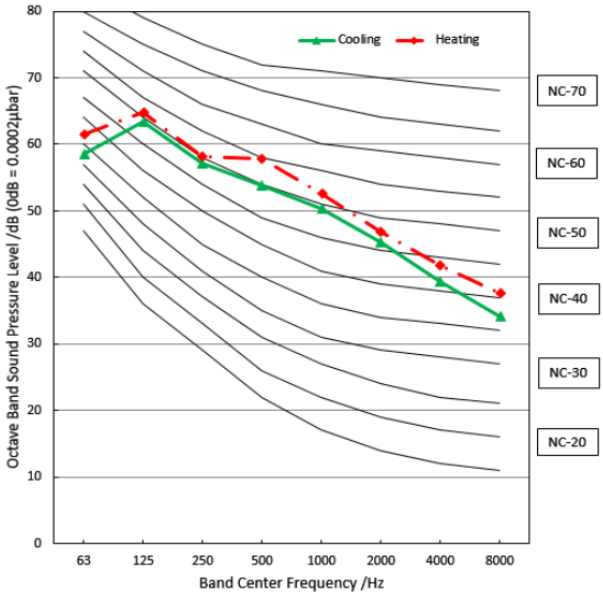


Note:H= 0.5 height of the outdoor unit.*

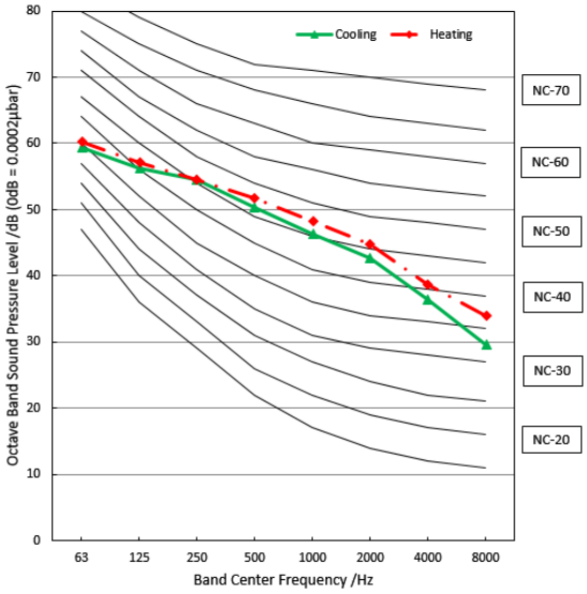
Notes:

- Sound is measured at 3.25ft (1.0m) Away from center of the unit.
- Data is valid at free field condition.
- Data is valid at nominal operation condition.
- Reference acoustic pressure OdB=20μPa.
- Sound level will vary depending on arrange off factors such as the construction (acoustic absorption coefficient) of particular rooms in which the equipment is installed.
- The operating conditions are assumed to be standard.

MVP-24-HP-C-230A00-0 & CENTRAL-24-HP-C-230B00-O



MVP-18-HP-C-230A00-0



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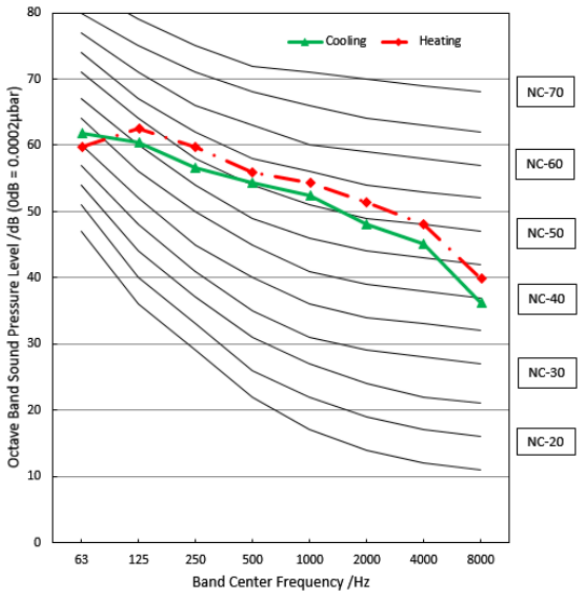

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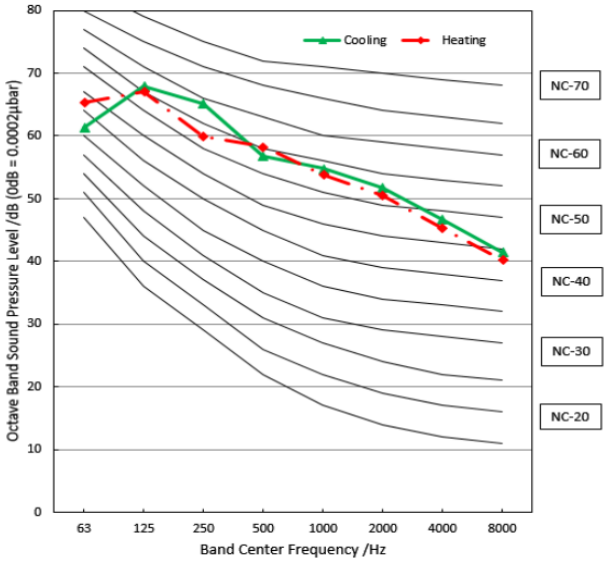
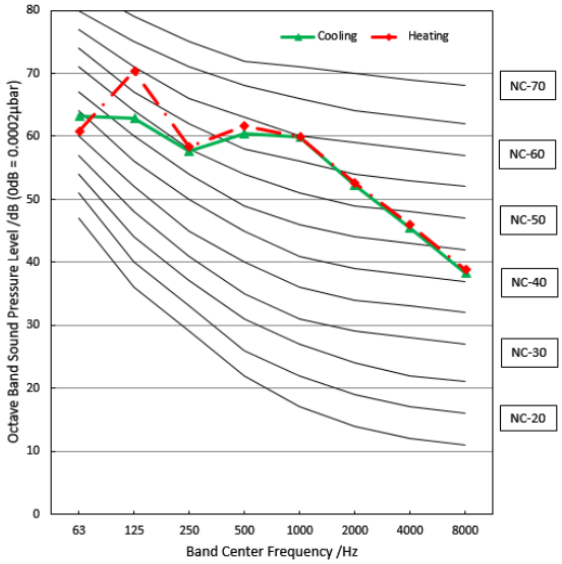


CENTRAL-36-HP-C-230B00-O



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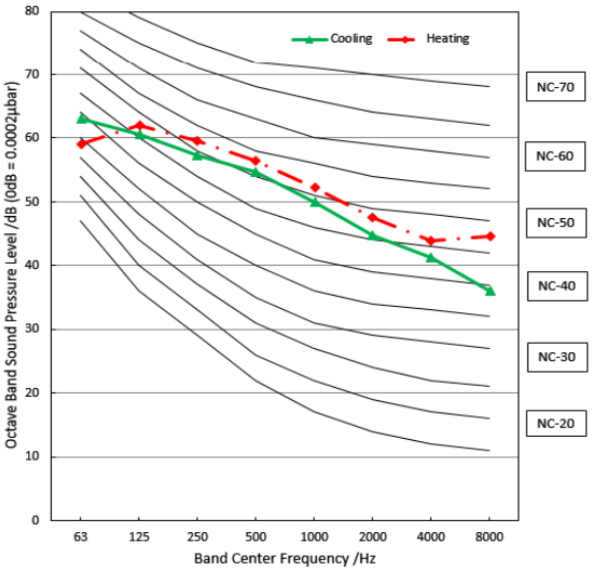

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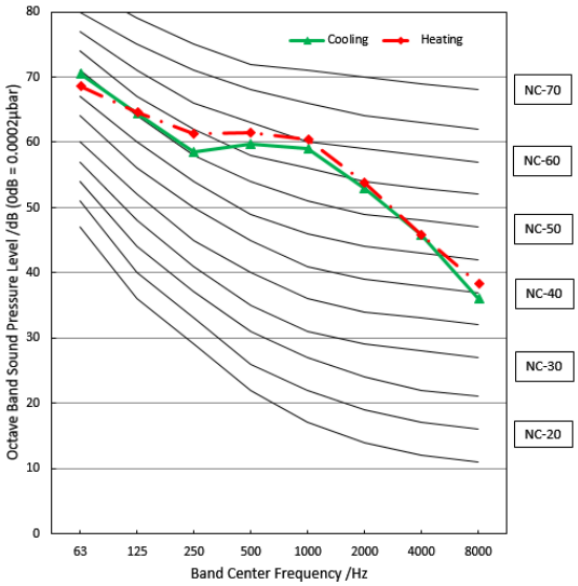

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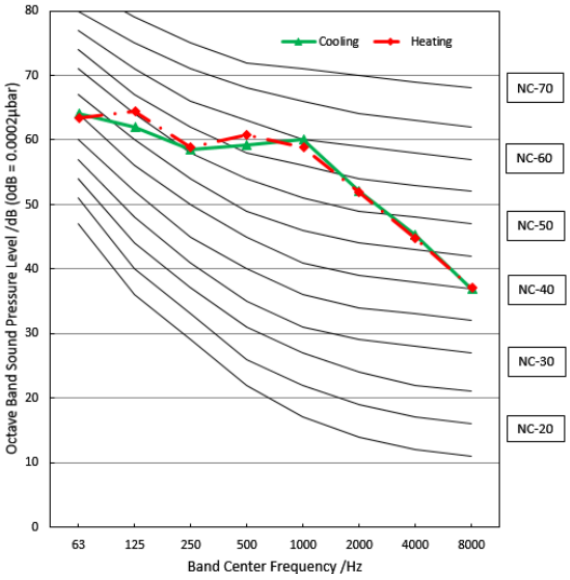

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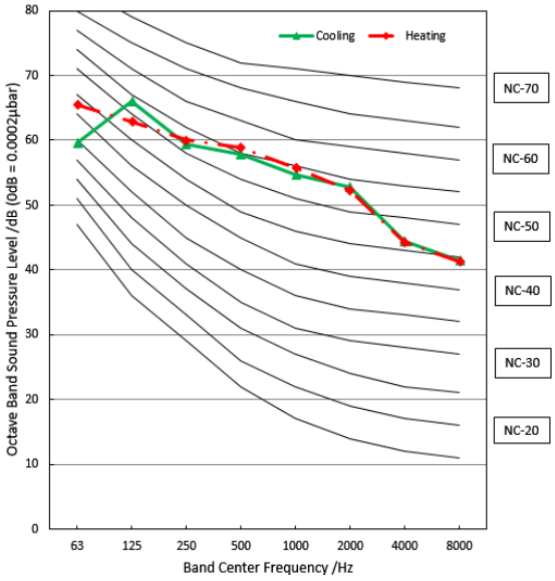

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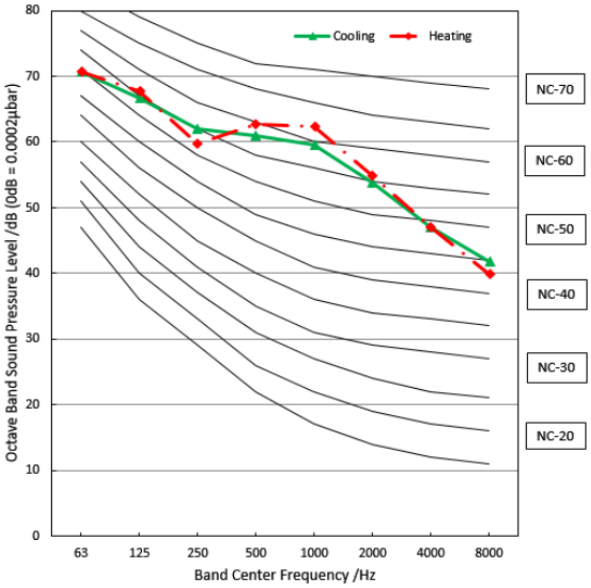
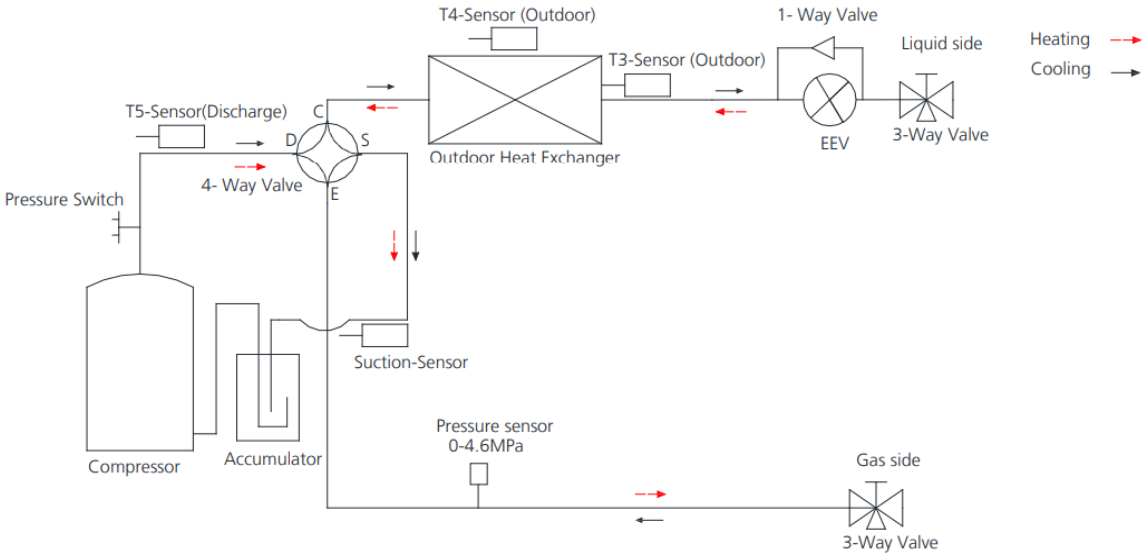
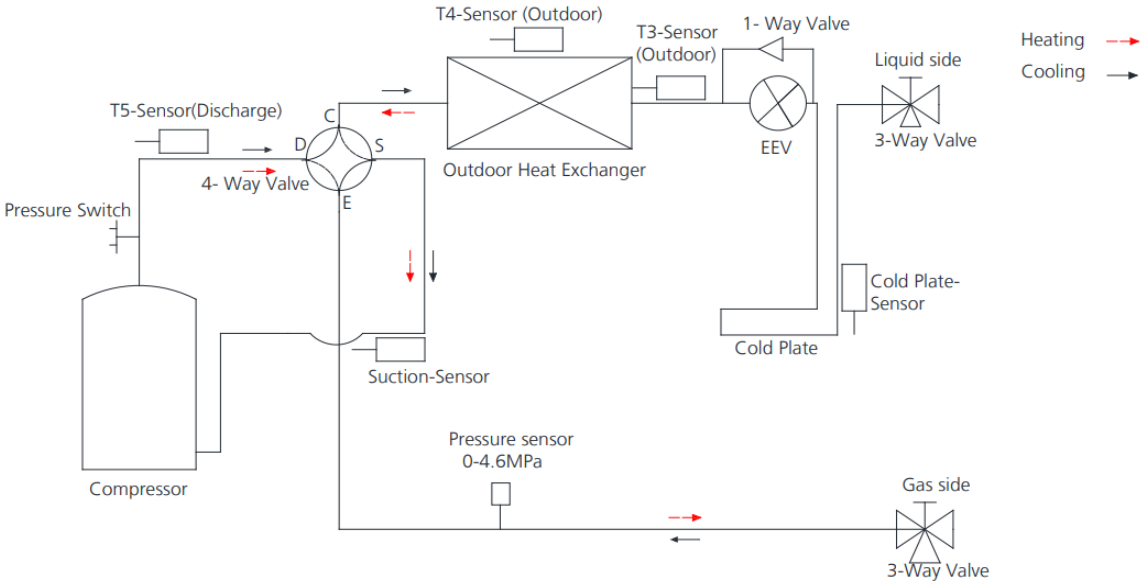


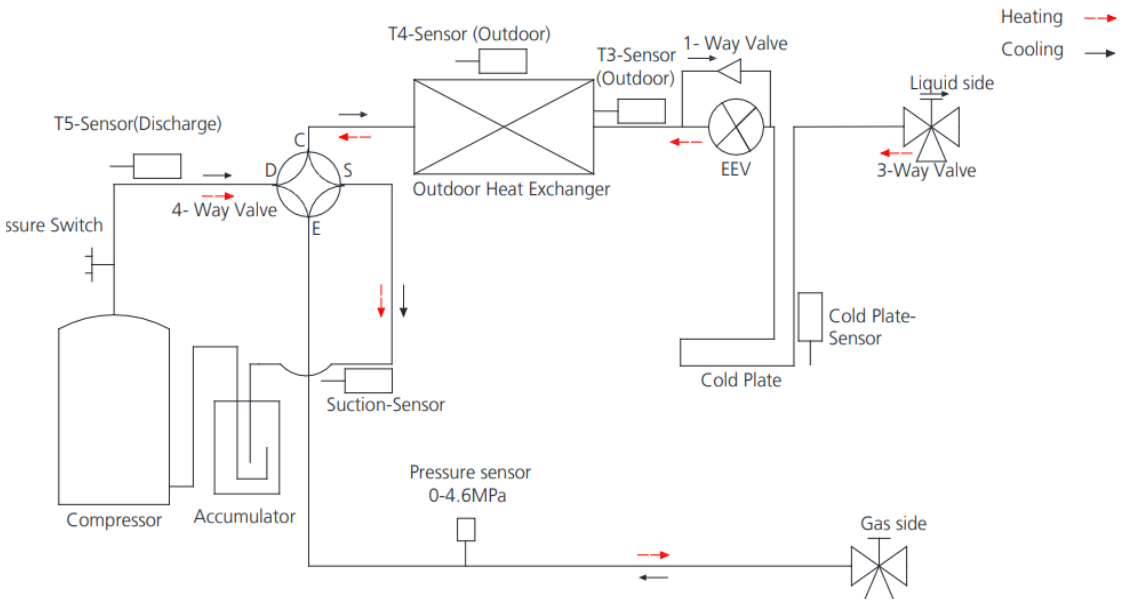
1.7 Refrigerant Cycle Diagrams



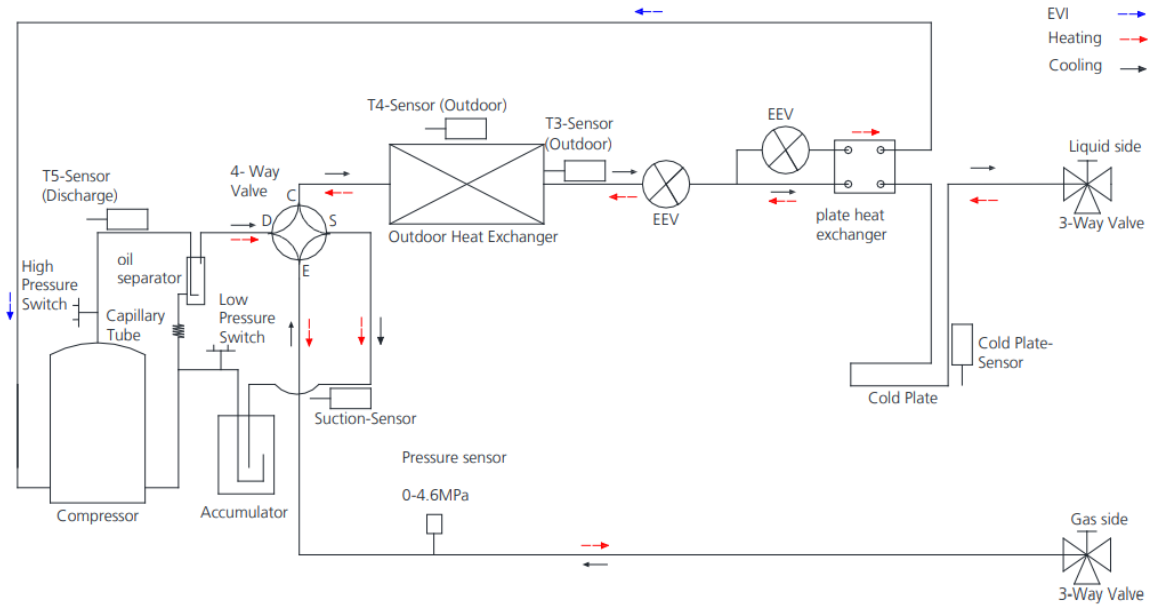
Model No.	Pipe Size (Diameter: Ø) inch(mm)		Piping Length (ft/m)		Elevation (ft/m)		Additional Refrigerant
	Gas	Liquid	Rated	Max.	Rated	Max.	
MVP-18-HP-C-230A00-O	3/4 (19)	3/8 (9.52)	24.6 (7.5)	98.4 (30)	0	65.6 (20)	0.7 oz/ft (65g/m)



Model No.	Pipe Size (Diameter: Ø) inch(mm)		Piping Length (ft/m)		Elevation (ft/m)		Additional Refrigerant
	Gas	Liquid	Rated	Max.	Rated	Max.	
MVP-30-HP-C-230A00-O	3/4 (19)	3/8 (9.52)	24.6 (7.5)	164 (50)	0	82 (25)	0.7 oz/ft (65g/m)



Model No.	Pipe Size (Diameter: Ø) inch(mm)		Piping Length (ft/m)		Elevation (ft/m)		Additional Refrigerant
	Gas	Liquid	Rated	Max.	Rated	Max.	
MVP-24-HP-C-230A00-O	3/4 (19)	3/8 (9.52)	24.6 (7.5)	164 (50)	0	82 (25)	0.7 oz/ft (65g/m)
CENTRAL-24-HP-C-230B00-O	3/4 (19)	3/8 (9.52)	24.6 (7.5)	164 (50)	0	82 (25)	
MVP-36-HP-C-230A00-O	3/4 (19)	3/8 (9.52)	24.6 (7.5)	164 (50)	0	98.4 (30)	
CENTRAL-30-HP-C-230B00-O	3/4 (19)	3/8 (9.52)	24.6 (7.5)	164 (50)	0	82 (25)	
MVP-48-HP-C-230A00-O	3/4 (19)	3/8 (9.52)	24.6 (7.5)	246 (75)	0	98.4 (30)	
CENTRAL-48-HP-C-230B00-O	3/4 (19)	3/8 (9.52)	24.6 (7.5)	246 (75)	0	98.4 (30)	
MVP-60-HP-C-230A00-O	3/4 (19)	3/8 (9.52)	24.6 (7.5)	246 (75)	0	98.4 (30)	

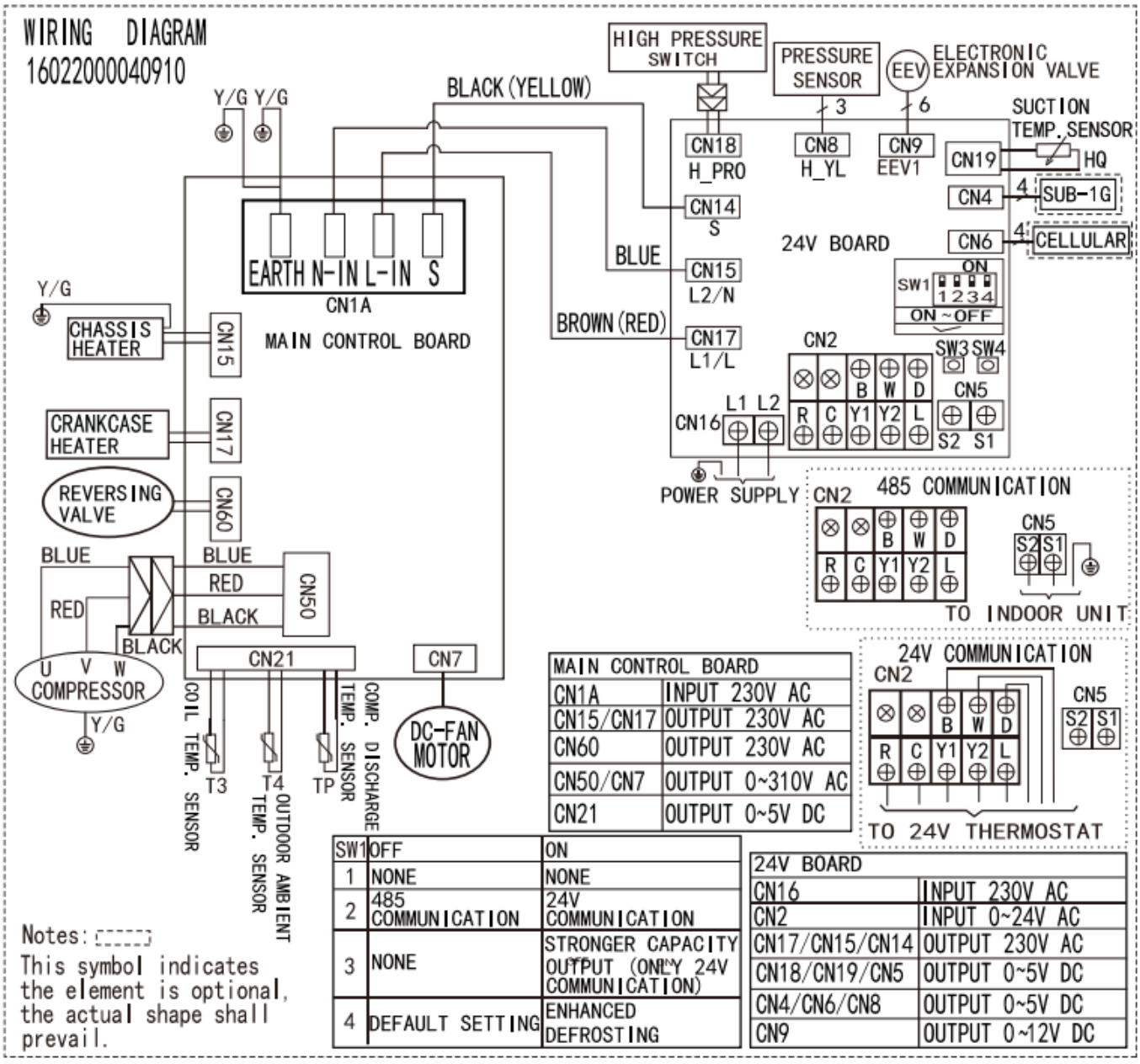


Model No.	Pipe Size (Diameter: Ø) inch(mm)		Piping Length (ft/m)		Elevation (ft/m)		Additional Refrigerant
	Gas	Liquid	Rated	Max.	Rated	Max.	
CENTRAL-36-HP-C-230B00-O	3/4 (19)	3/8 (9.52)	24.6 (7.5)	246 (75)	0	98.4 (30)	0.7 oz/ft (65g/m)
CENTRAL-60-HP-C-230B00-O	3/4 (19)	3/8 (9.52)	24.6 (7.5)	246 (75)	0	98.4 (30)	

1.8 Electrical Wiring Diagrams

ODU Model	ODU Wiring Diagram	ODU Main Printed Circuit Board	24V Printed Board
MVP-18-HP-C-230A00-O	16022000040910	171220000457661	17122000062325
MVP-24-HP-C-230A00-O	16022000040710	17122000048064	
CENTRAL-24-HP-C-23000-O	16022000040710		
MVP-30-HP-C-230A00-O	16022000040690	17122300007152	
MVP-36-HP-C-230A00-O	16022000041438		
CENTRAL-30-HP-C-23000-O	16022000041438		
CENTRAL-36-HP-C-23000-O	16022000041477		
MVP-48-HP-C-230A00-O	16022000041477		
CENTRAL-48-HP-C-23000-O	16022000041477		
MVP-60-HP-C-230A00-O	16022000041438		
CENTRAL-60-HP-C-23000-O	16022000041440		

Outdoor unit wiring diagram: 16022000040910

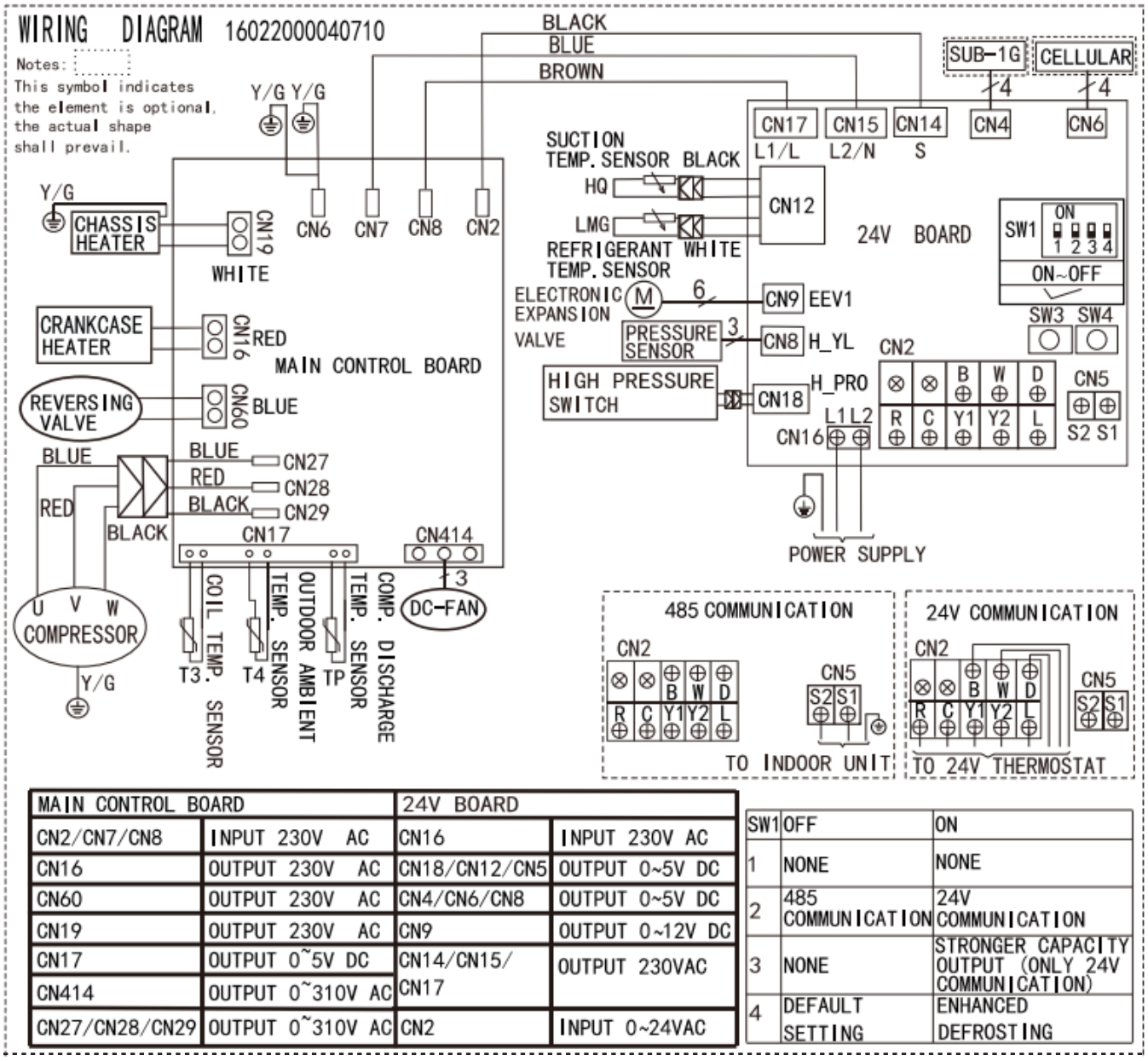


MAIN CONTROL BOARD	
CN1A	INPUT 230V AC
CN15/CN17	OUTPUT 230V AC
CN60	OUTPUT 230V AC
CN50/CN7	OUTPUT 0~310V AC
CN21	OUTPUT 0~5V DC

SW1	OFF	ON
1	NONE	NONE
2	485 COMMUNICATION	24V COMMUNICATION
3	NONE	STRONGER CAPACITY OUTPUT (ONLY 24V COMMUNICATION)
4	DEFAULT SETTING	ENHANCED DEFROSTING

24V BOARD	
CN16	INPUT 230V AC
CN2	INPUT 0~24V AC
CN17/CN15/CN14	OUTPUT 230V AC
CN18/CN19/CN5	OUTPUT 0~5V DC
CN4/CN6/CN8	OUTPUT 0~5V DC
CN9	OUTPUT 0~12V DC

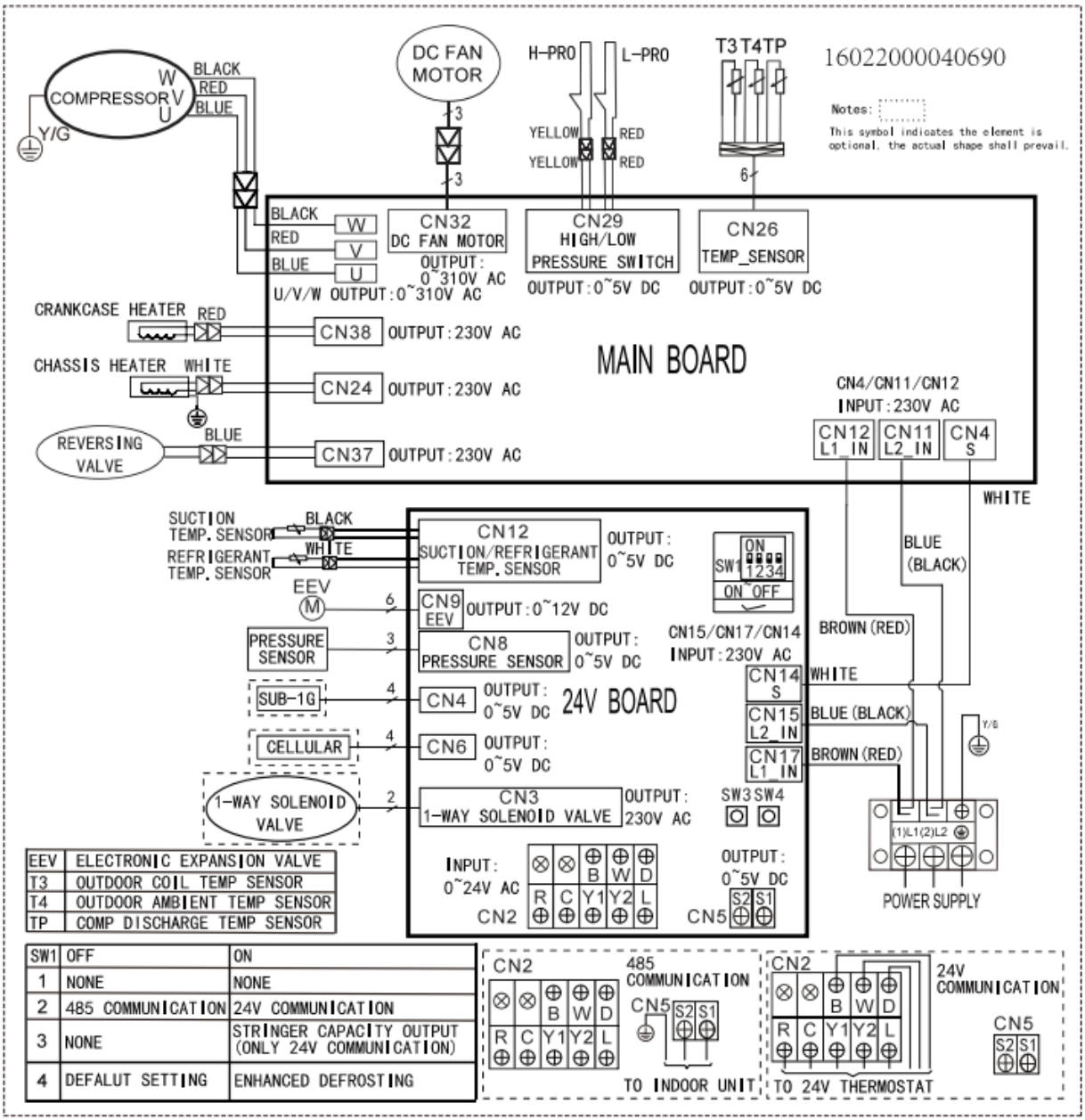
Outdoor unit wiring diagram: 16022000040710



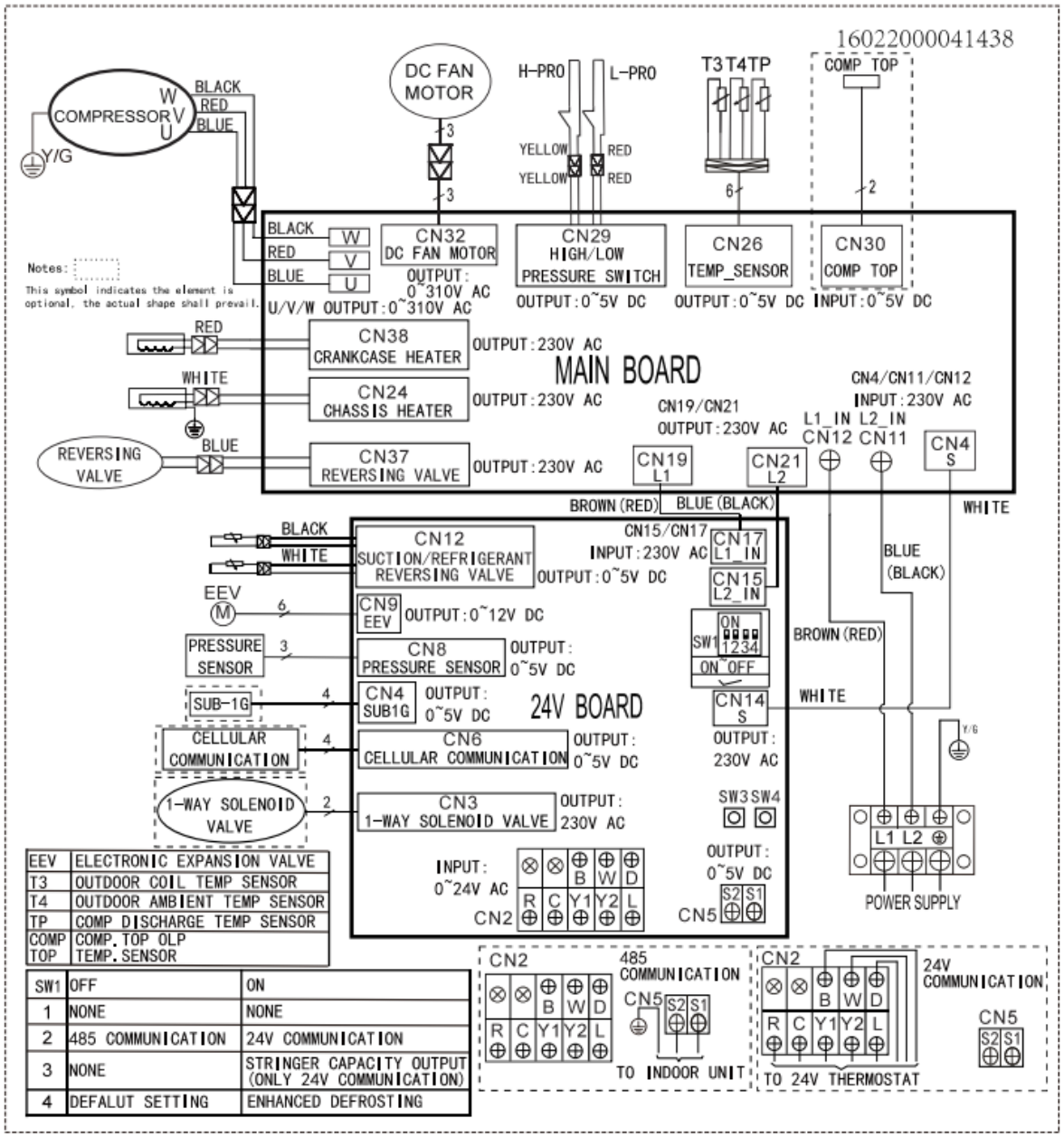
MAIN CONTROL BOARD		24V BOARD	
CN2/CN7/CN8	INPUT 230V AC	CN16	INPUT 230V AC
CN16	OUTPUT 230V AC	CN18/CN12/CN5	OUTPUT 0~5V DC
CN60	OUTPUT 230V AC	CN4/CN6/CN8	OUTPUT 0~5V DC
CN19	OUTPUT 230V AC	CN9	OUTPUT 0~12V DC
CN17	OUTPUT 0~5V DC	CN14/CN15/ CN17	OUTPUT 230VAC
CN414	OUTPUT 0~310V AC		
CN27/CN28/CN29	OUTPUT 0~310V AC	CN2	INPUT 0~24VAC

SW1	OFF	ON
1	NONE	NONE
2	485 COMMUNICATION	24V COMMUNICATION
3	NONE	STRONGER CAPACITY OUTPUT (ONLY 24V COMMUNICATION)
4	DEFAULT SETTING	ENHANCED DEFROSTING

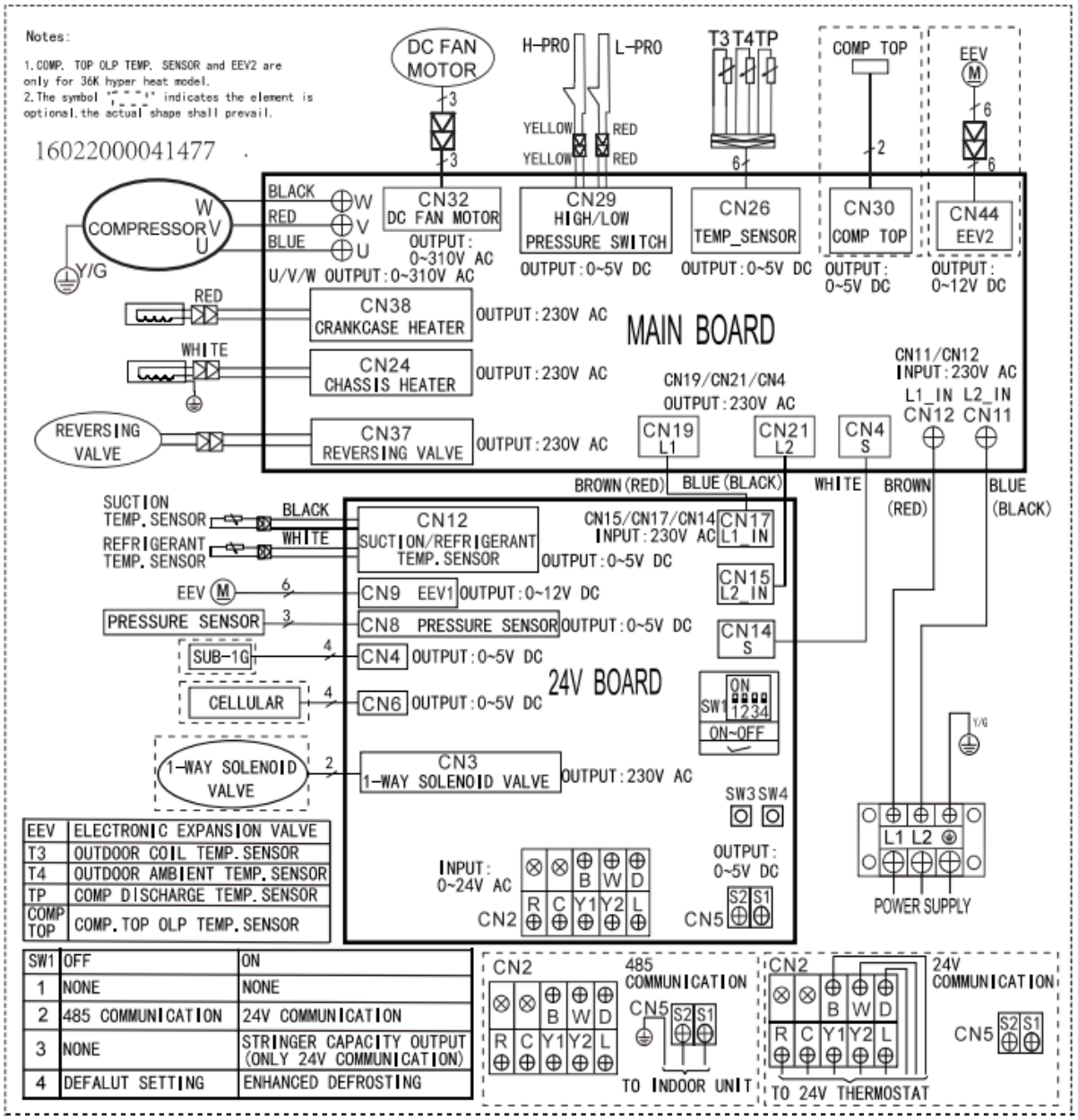
Outdoor unit wiring diagram: 16022000040690



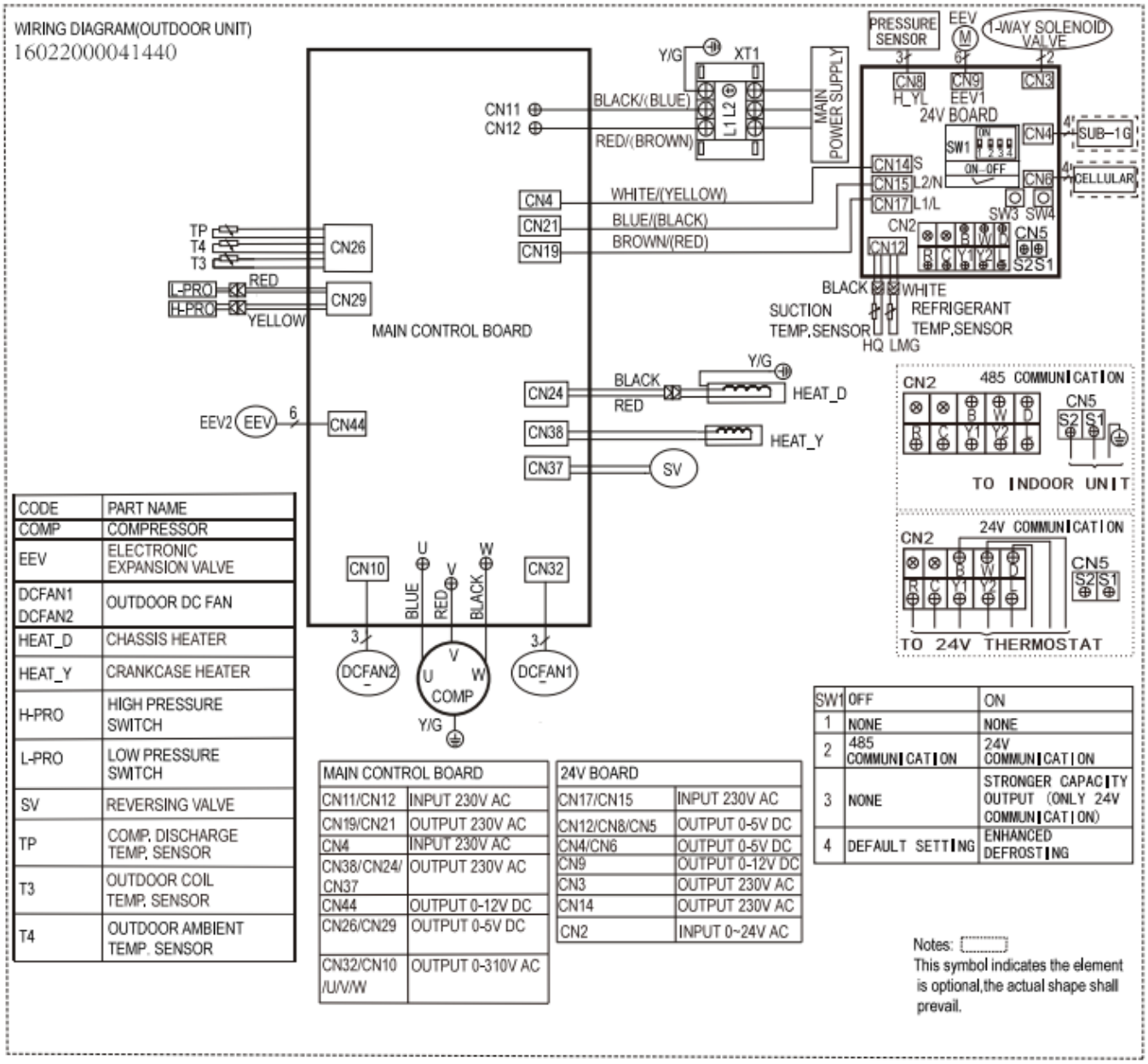
Outdoor unit wiring diagram: 16022000041438



Outdoor unit wiring diagram: 16022000041477



Outdoor unit wiring diagram: 16022000041440



CODE	PART NAME
COMP	COMPRESSOR
EEV	ELECTRONIC EXPANSION VALVE
DCFAN1 DCFAN2	OUTDOOR DC FAN
HEAT_D	CHASSIS HEATER
HEAT_Y	CRANKCASE HEATER
H-PRO	HIGH PRESSURE SWITCH
L-PRO	LOW PRESSURE SWITCH
SV	REVERSING VALVE
TP	COMP. DISCHARGE TEMP. SENSOR
T3	OUTDOOR COIL TEMP. SENSOR
T4	OUTDOOR AMBIENT TEMP. SENSOR

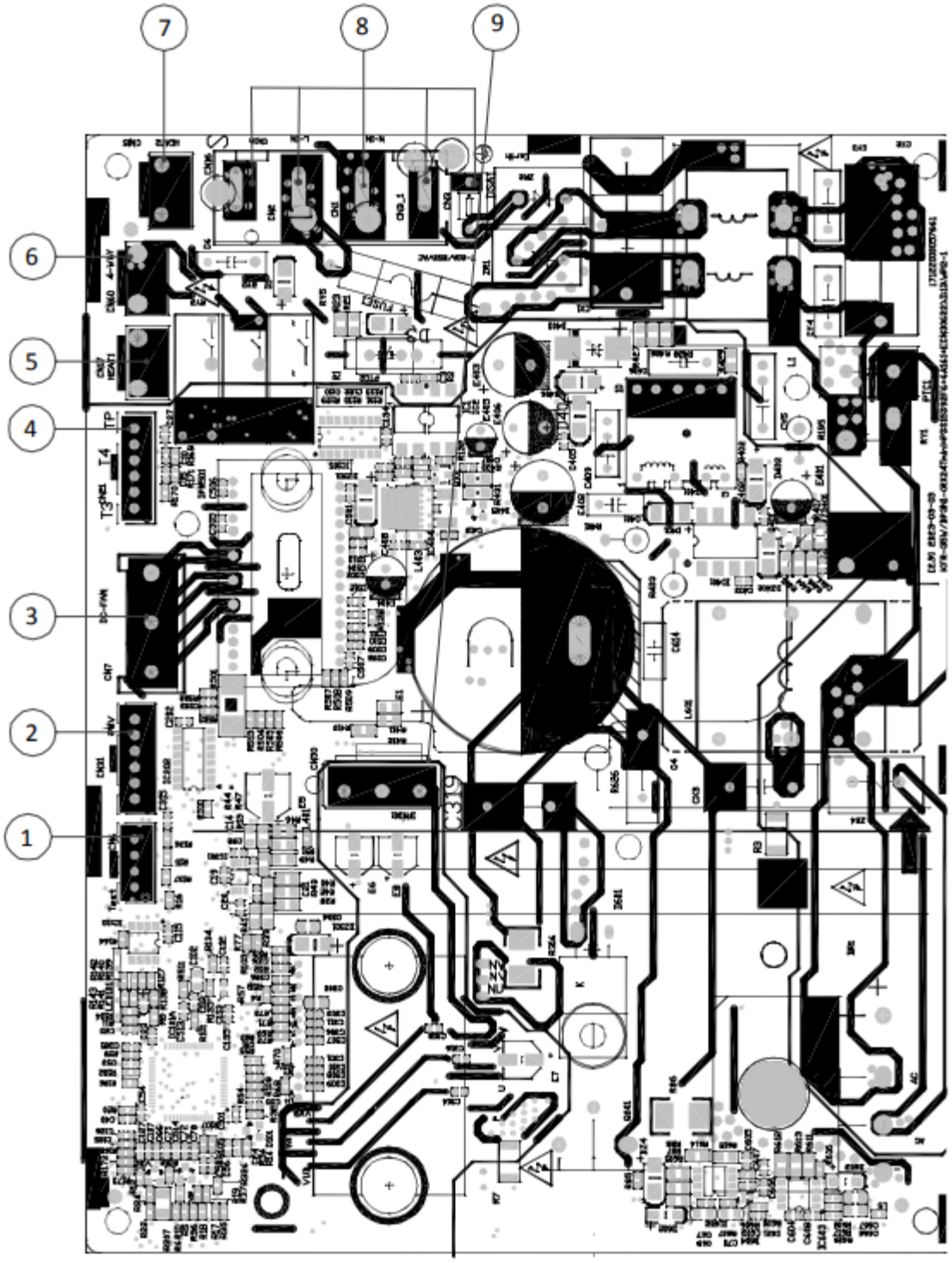
MAIN CONTROL BOARD	
CN11/CN12	INPUT 230V AC
CN19/CN21	OUTPUT 230V AC
CN4	INPUT 230V AC
CN38/CN24/CN37	OUTPUT 230V AC
CN44	OUTPUT 0-12V DC
CN26/CN29	OUTPUT 0-5V DC
CN32/CN10 /U/V/W	OUTPUT 0-310V AC

24V BOARD	
CN17/CN15	INPUT 230V AC
CN12/CN8/CN5	OUTPUT 0-5V DC
CN4/CN6	OUTPUT 0-5V DC
CN9	OUTPUT 0-12V DC
CN3	OUTPUT 230V AC
CN14	OUTPUT 230V AC
CN2	INPUT 0~24V AC

SW1	OFF	ON
1	NONE	NONE
2	485 COMMUNICATION	24V COMMUNICATION
3	NONE	STRONGER CAPACITY OUTPUT (ONLY 24V COMMUNICATION)
4	DEFAULT SETTING	ENHANCED DEFROSTING

Notes:
This symbol indicates the element is optional,the actual shape shall prevail.

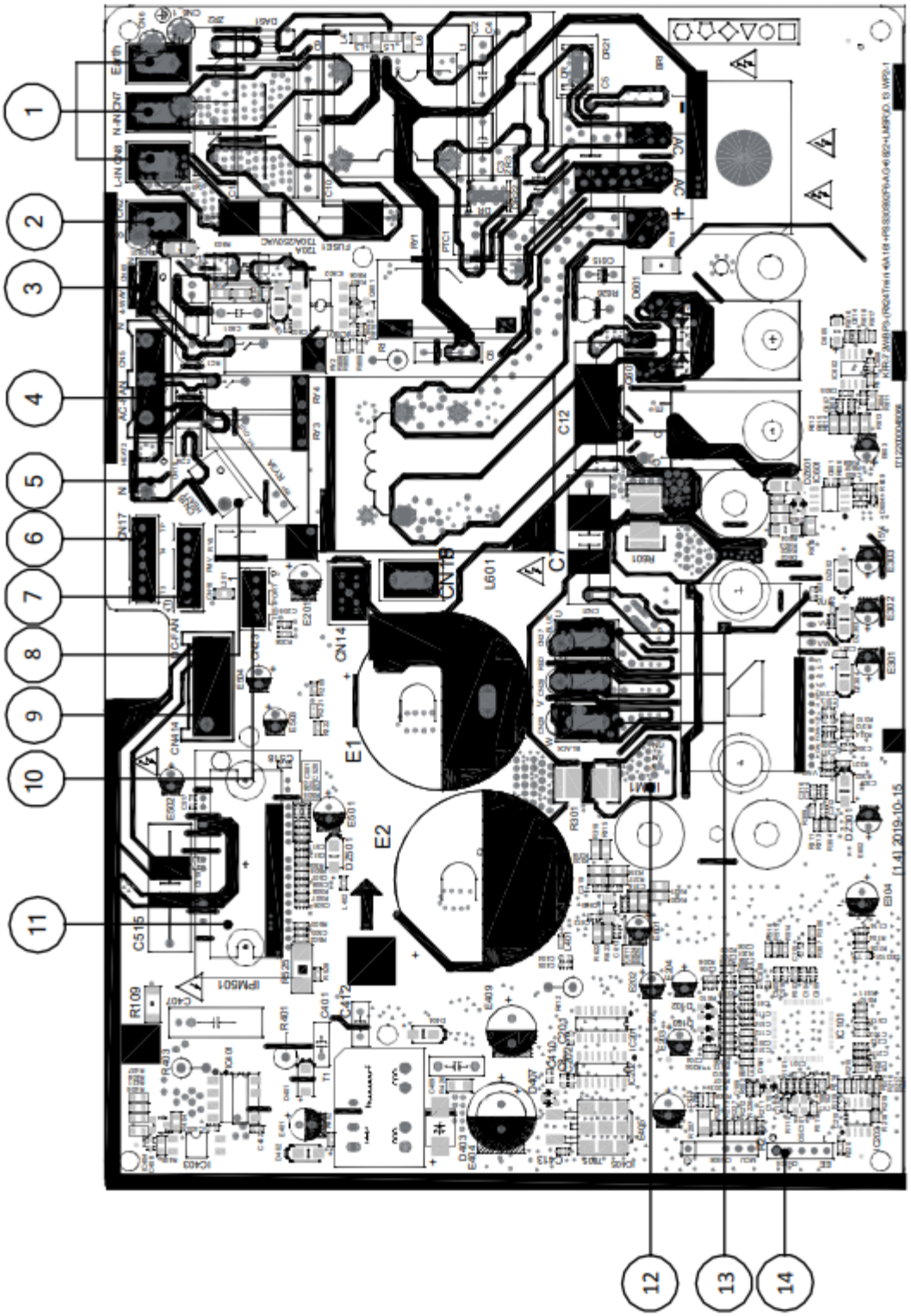
Outdoor unit printed circuit board diagram: 17122000057661



No.	Name	NC#	Meaning
1	TESTPORT	CN6	Used for testing (Output: 0-5VDC)
2	PMV	CN31	Connects to electric expansion valve (Output: 0~2VDC)
3	DC-FAN	CN7	Connects to DC fan (Output: 0~310VAC)
4	TP T4 T3	CN21	Connect to pipe temp. sensor T3, ambient temp. sensor T4, exhaust temp. sensor TP (output: 0-5VDC)
5	HEAT1	CN17	Connect to compressor heater (Output: 230VAC)
6	4-WAY	CN60	Connect to 4 way valve (Output: 230VAC)
7	HEAT2	CN15	Connect to chassis heater(Output: 230VAC)
8	CN1A	/	S: connect to indoor unit communication
		/	L_in: connect to L-line (230VAC input)
		/	N_in: connect to N-line (230VAC input)
		/	Earth
9	CN50	W	Connect to compressor (Output: 0~310VAC)
		V	
		U	

Note: This section is for reference only. Please take practicality as standard.

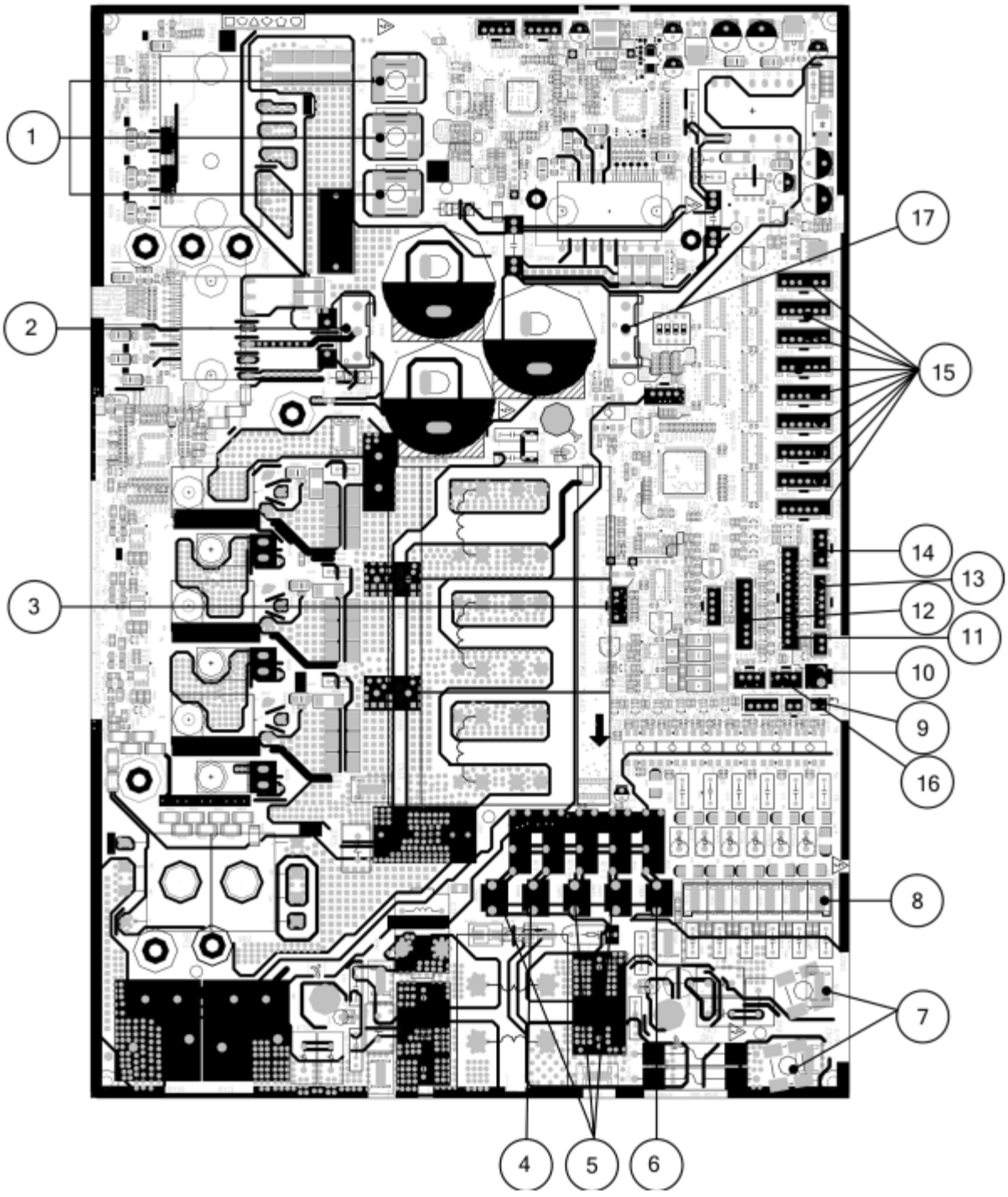
Outdoor unit printed circuit board diagram: 17122000048064 & 17122000048066



No.	Name	NC#	Meaning
1	Power Supply	CN6	Earth: Connect to Ground
		CN7	N_in: Connect to N-line (230VAC Input)
		CN8	L_in: Connect to L-line (230VAC input)
2	S	CN2	S: Connect to indoor unit communication (230VAC input)
3	4-WAY	CN60	Connect to 4 way valve (Output: 230VAC)
4	AC-FAN	CN5	Connect to AC fan
5	HEAT2	CN19	Connect to chassis heater (Output: 230VAC)
6	TP T4 T3	CN17	Connect to pipe temp. sensor T3, ambient temp. sensor T4, exhaust temp. sensor TP (Output: 0~5VDC)
7	PMV	CN18	Connect to Electric Expansion Valve
8	HEAT1	CN16	Connect to compressor heater (Output: 230VAC)
9	DC-FAN	CN414	Connect to DC fan (Output: 0~310VAC)
10	TESTPORT	CN23	Used for testing
11	FAN_IPM	IPM501	IPM for DC fan
12	COMP_IPM	IPM1	IPM for compressor
13	U	CN27	Connect to compressor (Output: 0~310VAC)
	V	CN28	
	W	CN29	
14	EE_PORT	CN505	EEPROM programmer port

Note: This section is for reference only. Please take practicality as standard.

Outdoor unit printed circuit board diagram: 17122300007152

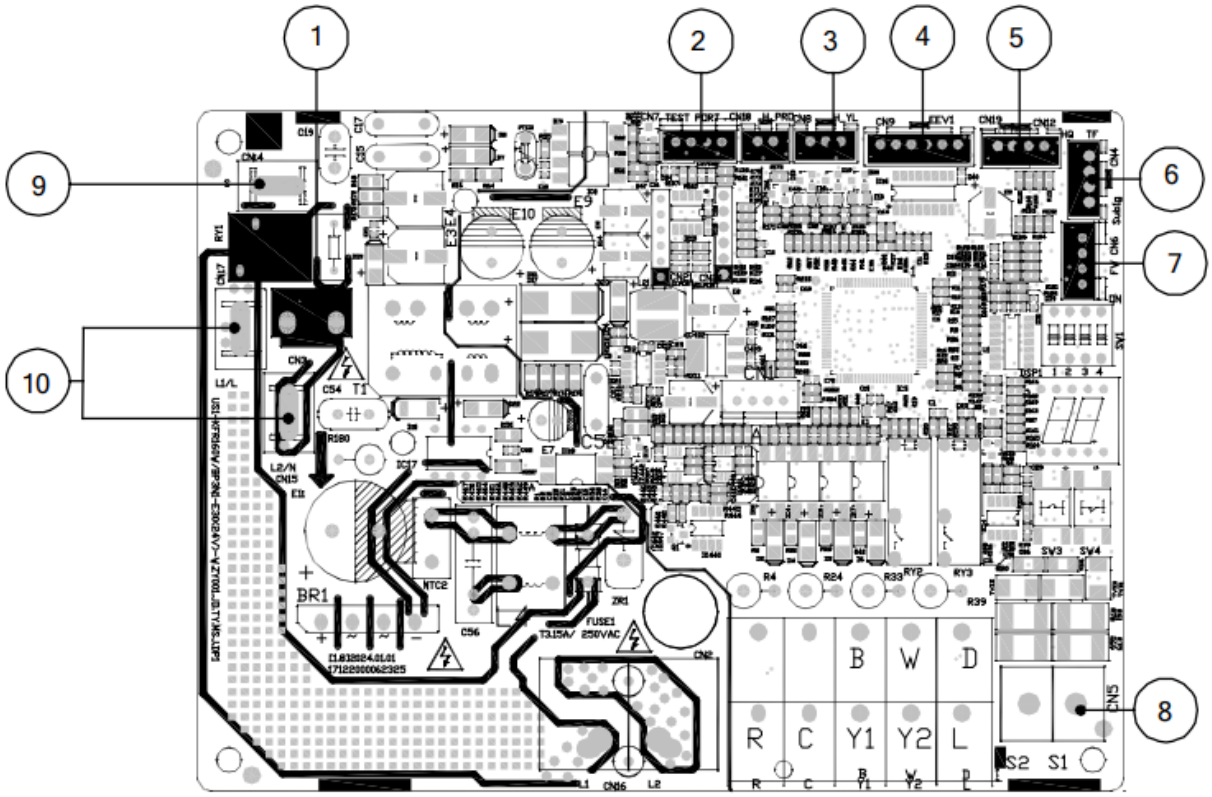


No.	Name	NC#	Meaning
1	COMPRESSOR	W	Connect to compressor (Output: 0~310VAC)
		V	
		U	
2	DC-FAN1	CN32	Connect to DC fan (Output: 0~310VAC)
3	TESTPORT	CN45	Used for testing
4	HEAT_Y	CN38	Connect to compressor heater (Output: 230VAC)
5	4-WAY	CN37	Connect to 4 way valve 1 (Output: 230VAC)
		CN25	Connect to 4 way valve 2 (Output: 230VAC)
		CN42	Connect to 4 way valve 3 (Output: 230VAC)
6	HEAT_D	CN24	Connect to chassis heater (Output: 230VAC)
7	POWER SUPPLY	CN11	N_in: connect to N-line (230 VAC input)
		CN12	L-in: connect to L-line (230VAC input)
8	S-A	CN43	S: connect to indoor unit communication (230VAC input)
	S-B		
	S-C		
	S-D		
	S-E		
	S-F		
9	TBH-IN TBH-OUT T3B TF	CN9	Connect to cold plate inlet temp.sensor TBH-IN, cold plate outlet temp. sensor TBH-OUT, condenser coil middle temp. sensor T3B, Refrigerant tube inlet temp. sensor TF
10	OLP TEMP. SENSOR	CN30	Connect to compressor top temp. sensor (Output 0~5VDC)
11	T2B	CN28	Connect to evaporator coil outlet temperature sensor T2B
12	/	CN27	Connect to key board CN1
13	T3 T4 TP	CN26	Connect to condenser coil temp. sensor T3, ambient temp. sensor T4, exhaust temp. sensor TP (Output: 0~5VDC)
14	H-PRO, L-PRO	CN29	Connect to high and low pressure switch (pin1-pin2 & pin3-pin4: 5VDC pulse wave)

No.	Name	NC#	Meaning
15	EEVA	CN17	Connect to electric expansion valve (Output: 0~12VDC)
	EEVB	CN16	
	EEVC	CN22	
	EEVD	CN14	
	EEVE	CN13	
	EEVF	CN1	
	EEV1	CN1	
	EEV2	CN44	
	EEV3	CN3	
16	H_YL	CN49	Connect to high pressure sensor
17	DC-FAN2	CN10	Connect to DC fan (Output: 0~310VAC)

Note: This section is for reference only. Please take practicality as standard.

Outdoor unit printed circuit board diagram: 17122000062325



No.	Name	NC#	Meaning
1	/	CN3	Connect to one-way solenoid valve (Output: 230VAC)
2	TESTPORT	CN7	Used for testing (Output: 5VDC)
3	/	CN8	Connect to pressure sensor (Output: 0~5VDC)
4	/	CN9	Connect to electric expansion valve (Output: 0~5VDC)
5	/	CN12	Connect to suction temp. sensor, cold plate temp. sensor (Output: 0~5VDC)
6	/	CN4	Connect to SUB-1G (Output: 0~5VDC)
7	/	CN6	Connect to CELLULAR (Output: 0~5VDC)
8	S1+S2	SW5	Connect to indoor unit communication (Output: 0~5VDC)
9	S	CN14	Connect to main board S (Input: 230VAC)
10	Power Supply	CN17	Connect to main board L1-IN (Input: 230VAC)
		CN15	Connect to main board L2/N-IN (Input: 230VAC)

2.1 Location Selection

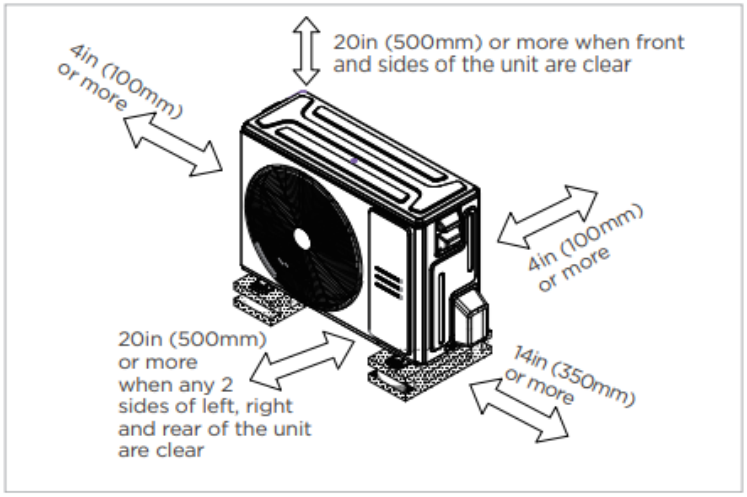
Name	Shape	Quantity
Drain Joint		1
Seal		1

Location Selection:

*** Unit location selection can refer to the installation manual.**
***DO NOT install the unit in the following locations:**

- Near an obstacle that will block air inlets or outlets.
- Near a public street, crowded areas, or where noise from the unit will disturb others.
- Near animals or plants that will be harmed by hot air discharge.
- Near any source of combustible gas.
- In a location that is exposed to large amounts of dust.
- In a location exposed to excessive amounts of salty air.

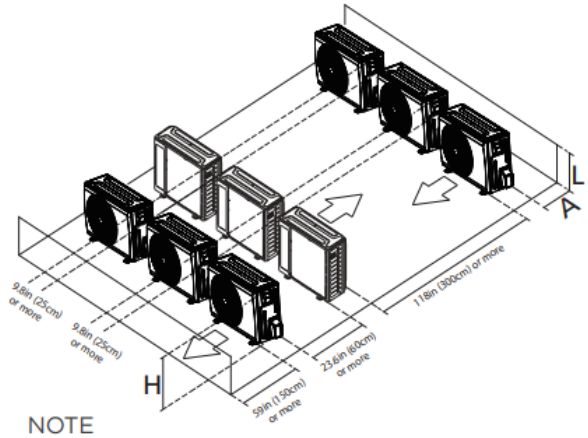
Make sure to meet all spatial requirements shown in Installation Clearance Requirements below:



Rows of Series Installation:

The relations between H, A and L are as follows:

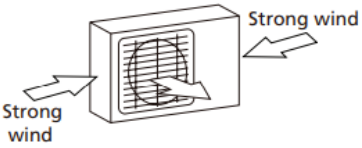
	L	A
L ≤ H	L ≤ 1/2H	9.8in (25cm) or more
	1/2H < L ≤ H	11.8in (30cm) or more
L>H	Cannot be installed	

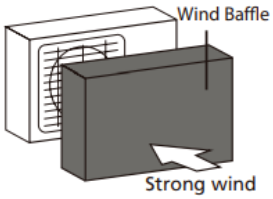


NOTE
H: Unit height
L: Height of the wall behind the unit
A: Distance between unit and wall

If the unit is exposed to heavy wind:

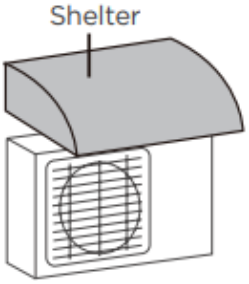
- Install the unit so that the air outlet fan is at a 90° angle to the direction of the wind. If needed, build a barrier in front of the unit to protect it from extremely heavy winds.





If the unit is frequently exposed to heavy rain or snow:

- Build a shelter above the unit to protect it from the rain or snow. Be careful to not obstruct airflow around the unit.



If the unit is frequently exposed to salty air (seaside):

- Use an outdoor unit that is specially designed to resist corrosion.

2.2 Outdoor Unit Installation

Installing Drain Joint:

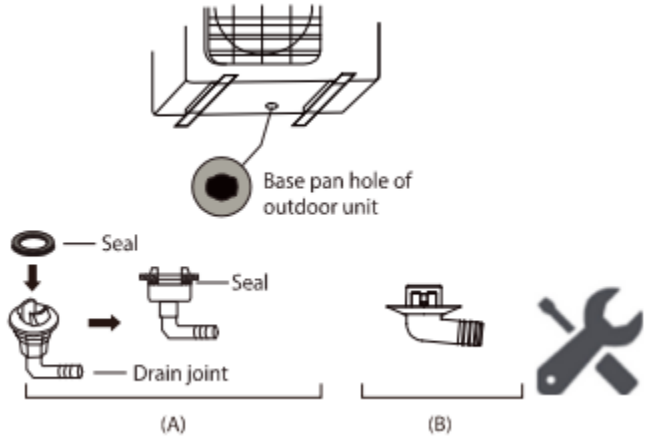
Before bolting the outdoor unit in place, you must install the drain joint at the bottom of the unit.
Note: There are two different types of drain joints depending on the type of outdoor unit.

If the drain joint comes with a rubber seal (see Fig. A), do the following:

1. Fit the rubber seal on the end of the drain joint that will connect to the outdoor unit.
2. Insert the drain joint into the hole in the base pan of the unit.
3. Rotate the drain joint 90° until it clicks in place facing the front of the unit. **For some panel plates you will need to use a tool.**
4. Connect a drain hose extension (not included) to the drain joint to redirect water from the unit during heating mode.

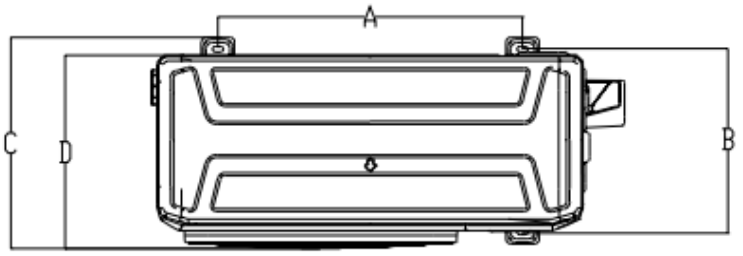
If the drain joint doesn't come with a rubber seal (see Fig. B) do the following:

1. Insert the drain joint into the hole in the base pan of the unit. The drain joint will click in place.
2. Connect a drain hose extension (not included) to the drain joint to redirect water from the unit during heating mode.



Anchor Outdoor Unit:

The outdoor unit can be anchored to the ground or to a wall-mounted bracket with bolt (M10). Prepare the installation base of the unit according to the dimensions below.
The following is a list of different outdoor unit sizes and the distance between their mounting feet.



Platform	Unit	D	A	B	C
X3	inch	12.99	20.12	12.48	13.62
	mm	330	511	317	346
X4	inch	13.46	26.1	13.94	15.5
	mm	342	663	354	394
X6	inch	14.76	24.2	15.6	17.3
	mm	375	615	397	440
D30	inch	16.14	26.50	15.87	17.9
	mm	410	673	403	455
E30	inch	16.34	24.96	15.9	17.99
	mm	415	634	404	457

2.3 Refrigerant Pipe Installation

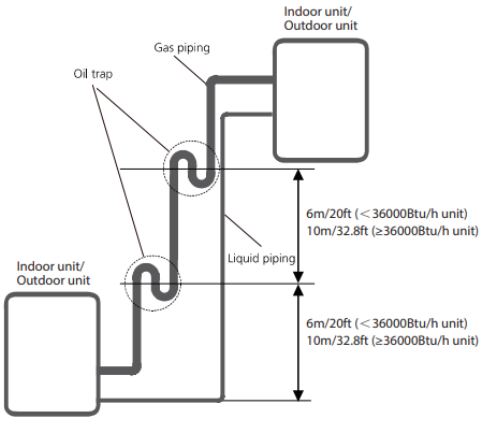
Maximum Length and Drop Height:

Ensure that the length of the refrigerant pipe, the number of bends, and the drop height between the indoor and outdoor units meets the requirements shown in the following table.

Capacity	Max. Length (ft/m)	Max. Elevation (ft/m)
18k	98.4/30	65.6/20
24k/30k	164/50	82/25
36k/48k/60k	246/75	98.4/30

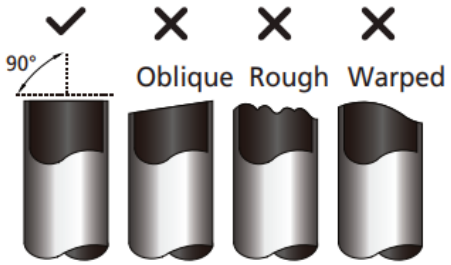
Caution:

1. The capacity test is based on the standard length and maximum permissive length is based on the system reliability.
2. Oil traps.
   - If oil flows back into the outdoor unit's compressor, this might cause liquid compression or deterioration of oil return. Oil traps in the rising gas piping can prevent this.
   - An oil trap should be installed every 20ft (6m) of vertical suction line riser (<36kBtu/h unit).
   - An oil trap should be installed every 32.8ft (10m) of vertical suction line riser (≥36kBtu/h unit).

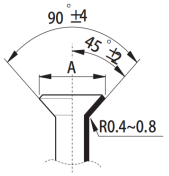


Procedure of Connecting Pipes:

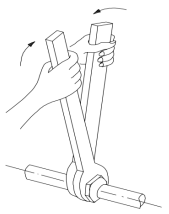
1. Choose the pipe size according to the specification table.
2. Confirm the cross way of the pipes.
3. Measure the necessary pipe length.
4. Cut the selected pipe with a pipe cutter.
   - Make the section flat and smooth.



5. Insulate the copper pipe.
   - Before test operation, the joint parts should not be heat insulated.
6. Flare the pipe.
   - Insert a flare nut into the pipe before flaring the pipe.
   - According to the following table to flare the pipe.

Pipe Diameter (inch(mm))	Flare dimension A (inch/mm)		Flare Shape
	Min	Max	
Ø3/8 (Ø9.52)	0.52/13.2	0.53/13.5	
Ø5/8 (Ø15.9)	0.76/19.2	0.78/19.7	
Ø3/4 (Ø19)	0.91/23.2	0.93/23.7	

   - After flaring the pipe, the opening part must be sealed by end cover or adhesive tape to avoid dust or exogenous impurity entering the pipe.
7. Drill holes if the pipes need to pass the wall.
8. According to the field condition to bend the pipes so that it can pass the wall smoothly.
9. Bind and wrap the wire together with the insulated pipe if necessary.
10. Set the wall conduit.
11. Set the supporter for the pipe.
12. Locate the pipe and fix it by supporter.
    - For horizontal refrigerant pipe, the distance between supporters should not exceed 3.28ft (1m).
    - For vertical refrigerant pipe, the distance between supporters should not exceed 4.92ft (1.5m).
13. Connect the pipe to the indoor unit and outdoor unit by using two crescent wrenches.
    - Be sure to use two crescent wrenches and proper torque to fasten the nut, too much torque will damage the bell mouthing, and too little of torque may cause leakage. Refer to the following table for different pipe connections.

Pipe Diameter (inch(mm))	Torque N.m. (lb. ft.)	Sketch Map
Ø3/8 (Ø9.52)	32~39 (23.6~28.8)	
Ø5/8 (Ø15.9)	57~71 (42~52.4)	
Ø3/4 (Ø19)	67~101 (49.4~74.5)	

2.4 Vacuum Drying and Leakage Testing

Purpose of Vacuum Drying:

- Eliminates moisture in the system to prevent the phenomena of ice-blockage and copper oxidation.
  -Ice-blockages will cause abnormal operation of system while copper oxidation will damage the compressor.
- Eliminating non-condensible gas(air) in the system will prevent the components from oxidizing, pressure fluctuation, and poor heat exchange during operation of the system.

Selection of a Vacuum Pump:

- The ultimate vacuum degree of a vacuum pump shall be -756mmHg or above.
- Precision of the vacuum pump shall reach 0.02mmHg or above

Operation Procedure for Vacuum Drying:

Due to different construction environments, two kinds of vacuum drying ways could be chosen, namely ordinary vacuum drying and special vacuum drying.

Ordinary vacuum drying:

1. When conducting first vacuum drying, connect a pressure gauge to the infusing mouth of gas pipe and liquid pipe and keep the vacuum pump running for 1 hour (vacuum degree of vacuum pump shall be reached at -755mmHg).
2. If the vacuum degree of the vacuum pump could not reach -755mmHg after 1 hour of drying it indicates that there is moisture or leakage in the pipeline of the system and needs to go on with drying for half an hour.
3. If the vacuum degree of the vacuum pump still cannot reach -755mmHg after 1.5 hours of drying check to see if there is a leak.
4. Leakage test: After the vacuum degree reaches -755mmHg stop vacuum drying and keep the pressure for 1 hour. If the indicator of the vacuum gauge does not go up it is good. If it does go up it indicates that there is moisture or a leak.

Special Vacuum Drying:
The special vacuum drying method shall be adopted when:

1. Finding moisture during flushing refrigerant pipe.
2. Conducting construction on a rainy day (Rain water might get into pipeline).
3. Construction period is long (Rain water might get into pipeline).

Procedures of special vacuum drying are as follows:

1. Vacuum drying for 1 hour.
2. Vacuum damage, filling nitrogen to reach 0.5Kgf/cm².

-Because nitrogen is a dry gas, vacuum damage could achieve the of vacuum drying, but this method cannot achieve drying thoroughly when there is too much moisture. Therefore special attention shall be drawn to prevent the entering of water and the formation of condensate water.

3. Vacuum drying again for half an hour.

-If the pressure reached -755mmHg, start pressure leakage test. If it cannot reach the value, repeat vacuum damage and vacuum drying again for 1 hour.

4. Leakage test: After the vacuum degree reaches -755mmHg, stop vacuum drying and keep the pressure for 1 hour. If the indicator of the vacuum gauge does not go up it is good. If it keeps going up it indicates that there is moisture or a leak.

2.5 Additional Refrigerant Charge

- After the vacuum drying process is carried out, the additional refrigerant charge process needs to be performed.
- The outdoor unit is factory charged with refrigerant. The additional refrigerant charge volume is decided by the diameter and length of the liquid pipe between the indoor and outdoor unit. Refer to the following formula to calculate the charge volume.

	Diameter of liquid pipe (inch(mm))	Formula
R545B	Ø1/4 (Ø6.35)	V=0.32(30)oz/ft(g/m)x(L-standard pipe length)
	Ø3/8 (Ø9.52)	V=0.7(65)oz/ft(g/m)x(L-standard pipe length)

V: Additional Refrigerant charge volume.
L: The length of the liquid pipe.

Note:

- Refrigerant may only be charged after the performed vacuum drying process.
- Always use gloves and glasses to protect your hands and eyes during the charge work.
- Use electronic scale or fluid infusion apparatus to weigh the refrigerant to be charged. Be sure to avoid excess refrigerant charge, it may cause liquid hammering of the compressor.
- Use gauge hoses to connect to the refrigerant cylinder, pressure gauge, and outdoor unit (The refrigerant should be charged in a liquid state). Before recharging the air in the gauges and hoses needs to be vented.
- After finishing the refrigerant recharge process, check whether there is refrigerant leakage at the connection joints(Using a leak detector or soapy water).

2.6 Piping Insulation

Insulation of Refrigerant Pipe:

1. **Operational Procedure of Refrigerant Pipe Insulation:**

Cut the suitable pipe > insulation (except joint section) > flare the piping > piping layout and connection > vacuum drying > insulate joints.

2. **Purpose of Refrigerant Pipe Insulation:**

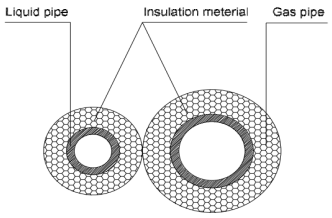
- During operation the temperature of the gas pipe and liquid pipe will be very hot/cold. Therefore insulation is necessary as without it will decrease performance and can cause the compressor to burnout.
- The gas pipe temperature is low during cooling operation, if lacking insulation it will condensate.
- The gas pipe temperature is high (generally 122°F -212°F (50°C-100°C)) in heating operating. If lacking insulation it can result in burns.

3. **Insulation Material Selection for Refrigerant Pipes:**

- Insulation should withstand 248°F (120°C)
- Choose insulation materials according to local codes.
- The thickness of the insulation layers needs to be above 10mm. If in a hot or wet environment the layer on insulation will need to be thicker.

4. **Highlights of insulation construction:**

- The gas pipe and liquid pipe needs to be insulated separately. (If the gas and liquid pipe were insulated together it will decrease the performance of the system).



- The insulation material at jointing pipes shall be 1.96in (5cm)~3.93in (10cm) longer than the gap of the insulation material.
- Insulation material at the joint needs to be inserted into the gap of the insulation material.
- Insulation material at the joint needs to be banded to the gap and liquid pipe tightly.
- The linking part should by glued together.
- Make sure not to bind the insulation material tightly, it can extrude air out of the material causing it to age faster.

2.7 Electrical Wiring

Highlights of Electrical Wiring:

- All wiring must comply with local and national electrical codes, regulations, and must be installed by a licensed electrician.
- All electrical connections must be made according to the Electrical Connection Diagram located on the panels of the indoor and outdoor units.
- If there is a serious safety issue with the power supply stop work immediately and explain your reasoning to the client. If required refuse to install the unit until the issue is remedied.
- Power voltage should be within 90-110% of the rated voltage. Insufficient power can cause a malfunction, electrical shock, or fire.
- Installation of a external surge protector at the outdoor disconnect is recommended.
- Install a disconnect making sure all poles have a contact separation of at least 1/8in (3mm) incorporated into the wiring. You must use an approved circuit breaker and disconnect.
- Only connect the unit to an individual branch circuit and do not connect another appliance to that circuit.
- Make sure the unit is properly grounded.
- Every wire must be firmly connected. Loose wiring can cause the terminal to overheat resulting in a malfunction or a fire.
- Do not let wires touch or rest against the refrigerant tubing, the compressor, or any moving parts.
- If installing aux. heat it must be installed at least 40in (1m) away from any combustible material.
- To avoid shock never touch electrical components after turning power off, wait 10 minutes or more before touching electrical components.
- Make sure to not cross electrical wiring with signal wiring as it can cause distortion, interference, or damage to control boards.
- Connect wiring to the outdoor unit before the indoor unit.

Table: Minimum Cross Sectional Area of Power and Signal Cables.

Rated Current of Appliance (A)	AWG
≤ 6	18
6-10	16
10-16	14
16-25	12
25-32	10

Outdoor Unit Wiring:

WARNING:
Before performing any electrical work or wiring, tun off the main power to the system.

1. Prepare the cable for connection

A. First choose the right cable size (choose the cable type according to local electrical codes and regulations).

B. The size of the power supply cable, signal cable, fuse, and switch needed is determined by the Minimum Circuit Ampacity of the unit. The Minimum Circuit Ampacity is indicated on the nameplate located on the side panel of the unit. Refer to this nameplate to choose the right cable, fuse, or switch.

C. Using wire strippers, strip the rubber jacket from both ends of the signal cable to revel approximately 5.9in (150mm) of wire.

D. Strip the insulation from the ends.

E. Using a wire crimper, crimp u-lugs on the ends.

Note: When connecting wires, strictly follow the wiring diagram found inside the electrical cover.

2. Remove the 2 screws fixed on the front right panel then take it down to perform wire connection (for double fan outdoor units). Unscrew the big handle and remove it (for single fan outdoor units).
3. Connect the u-lugs to the terminals and match the wire colors/labels with the labels on the terminal black. Firmly screw the u-lug of each wire to its corresponding terminal.
4. Clamp down the cable with the cable clamp.
5. Insulate unused wires with electrical tape. (Keep wires away from any electrical metal or parts).
6. Re-install the cover of the electrical panel.

2.8 Test Operation

1. **The test operation must be carried out after the installation has been completed.**
2. **Please confirm the following points before the test operation.**

- The indoor and outdoor unit are installed properly.
- Piping and wiring are properly connected.
- Make sure that there are no obstacles near the inlet and outlet of the unit that might cause poor performance or malfunction.
- The refrigerant system has no leaks.
- The drainage system is clear and draining to a safe location.
- The heating insulation is properly installed.
- The grounding wires are properly connected
- The length of the piping and the added refrigerant capacity has been recorded.
- Power voltage is correct for the system.

CAUTION: Failure to perform the test run may result in system damage, property damage, or personal injury.

3. **Test run instructions.**

A. Open both the liquid and gas valves.
B. Turn ON the main power and allow the unit to warm up.
C. Set the air conditioner to COOL mode and check the following points:

Indoor unit

- Double check to see if the room temperature is being registered correctly.
- Ensure the manual buttons on the indoor unit work properly.
- Check to see that the drainage system is clear and draining smoothly.
- Ensure there is no vibration or abnormal noise during operation.

Outdoor Unit

- Check to see if the refrigeration system is leaking.,
- Make sure there is no vibration or abnormal noise during operation.
- Ensure the wind, noise, and water generated by the unit do not disturb your neighbors or pose a safety hazard.

4. **Drainage test**

A. Ensure the drain pipe flows smoothly. New buildings should perform this test before finishing the ceiling.
B. Turn on the main power and run the unit in COOL mode.
C. Check to see that the water is discharged. It may take up to one minute before the unit begins to drain depending on the drain pipe.
D. Stop the unit (turn off power and reinstall the test cover).

3.1 Basic Functions

Unit Element Abbreviations:

Abbreviation	Element
T1	Indoor room temperature sensor
T2	Evaporator coil temperature sensor
T3	Condenser coil temperature sensor
T4	Outdoor ambient temperature sensor
Tsc	Adjusted setting of temperature
TP	Compressor discharge temperature sensor
CDIFTEMP	Cooling shutdown temperature
HDIFTEMP2	Heating shutdown temperature
TCDI1	Enter defrost temperature
TCDE1	Exit defrost temperature 1
TCDE2	Exit defrost temperature2 (maintain for a period of time)
TIMING_ DEFROST_ TIME	Enter defrost time
EE_TIME_ DEFROST7_ STRONG	Enter enhanced defrost time
TCDE1_ADD_ STRONG	Exit enhanced defrost temperature 1
TCDE2_ADD_ STRONG	Exit enhanced defrost temperature 2 (maintain for a period of time)

In this manual, such as CDIFTEMP, HDIFTEMP2, TCDE1, TCDE2, TIMING_DEFROST_TIME...ect, they are well-setting parameter of EEPROM.

Fan Mode:

When fan mode is activated:

- The outdoor fan and compressor are stopped.

Cooling Mode:

Compressor Control:

Reach the configured temperature

1. When the compressor runs continuously for within 120 minutes.
   - If the following conditions are satisfied, the compressor ceases operation.
     - Indoor room temperature (T1) is lower than or equal to (Tsc-CDIFTEMP-32.9°F (0.5°C)).
2. When the compressor runs continuously for more than 120 minutes.
   - If the following conditions are satisfied, the compressor ceases operation.
     - Calculated frequency(FB) is less than minimum limited frequency(FminC).
     - Compressor runs at FminC more than 10 minutes.
     - When indoor room temperature (T1) is lower than or equal to (Tsc-CDIFTEMP).

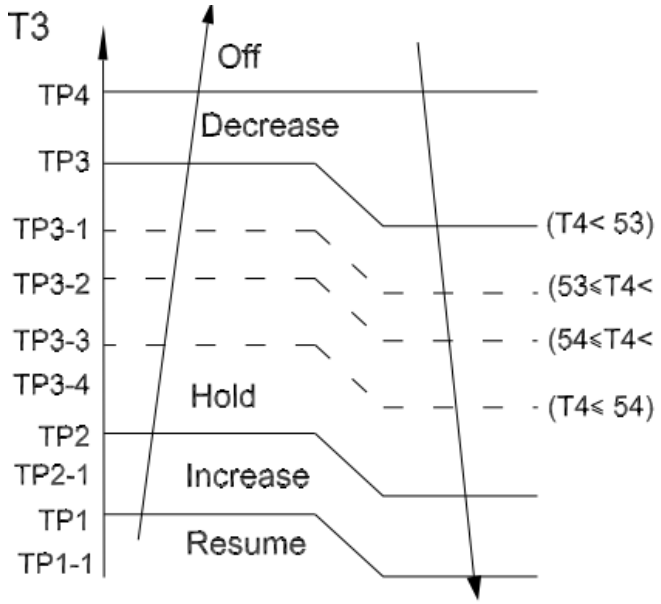
Note: CDIFTEMP is EEPROM setting parameter. It is 35.6°F (2°C) usually.

3. If one of the following conditions is satisfied, not judge protective time.
   - Compressor running frequency(fr) is more than test frequency (TestFre).
   - Compressor running frequency is equal to test frequency, T4 is more than 59°F (15°C) or T4 fault.
   - Change setting temperature.
   - Turn on/off turbo or sleep function.
   - Various frequency limit shutdown occurs.

Outdoor Fan Control:

- The outdoor unit will be run at different fan speeds according to T4 and compressor running frequency.
- For different outdoor units, the fan speeds are different.

Condenser Temperature Protection:



Heating Mode:

Compressor Control:

1. Reach the configured temperature.

- If the following conditions are satisfied, the compressor ceases operation.
  - Calculated frequency(fb) is less than minimum limit frequency(FminH).
  - Compressor runs at FminH more than 10 minutes.
  - T1 is higher than or equal to Tsc+ HDIFTEMP2.

Note: HDIFTEMP2 is EEPROM setting parameter. It is 35.6°F (2°C) usually.

- If one of the following conditions is satisfied, do not judge protective time.
  - Compressor running frequency(fr) is more than test frequency(TestFre).
  - When compressor running frequency is equal to test frequency, T4 is more than 59°F (15°C) or T4 fault.
  - Change setting temperature.
  - Turn on/off turbo or sleep function.

2. When the current is higher than the predefined safe value, surge protection is activated, causing the compressor to cease operations.

Outdoor Fan Control:

- The outdoor unit will be run at different fan speeds according to T4 and compressor running frequency.
- For different outdoor units, the fan speeds are different.

Defrosting Mode:

- The unit enters defrosting mode according to the temperature value of condenser temperature (T3) and outdoor ambient temperature (T4) as well as the compressor running time.
- In defrosting mode the compressor continues to run, the indoor and outdoor motor will cease operation and the defrost light of the indoor unit will turn on then the "dF" symbol is displayed.
- If any one of the following conditions is satisfied, system will end the defrosting mode.
  - T3 rises above TCDE1.
  - T3 maintained above TCDE2 for 80 seconds.
  - Unit runs for 15 minutes consecutively in defrosting mode.
- If Outdoor ambient temperature (T4) is lower than or equal to -7.6°F (-22°C) and compressor running time is more than TIMING_DEFROST_TIME. If any one of the following conditions is satisfied, defrosting ends and the machine switches to normal heating mode:
  - Unit runs for 10 minutes consecutively in defrosting.
  - Condenser temperature (T3) rises above 50°F (50°C).
- If any one of the following conditions is satisfied, the unit enters defrost mode.
  - If condenser temperature (T3) or outdoor ambient temperature (T4) is lower than 26.6°F (-3°C) for 30 seconds, Ts-T1 is lower than 41°F (5°C) and compressor running time is more than EE_TIME_DEFROST7_ADD.
  - If condenser temperature (T3) or outdoor ambient temperature (T4) is lower than 26.6°F (-3°C) for 30 seconds and compressor running time is more than EE_TIME_DEFROST7_ADD+30 minutes.
- If any one of the following conditions is satisfied defrosting ends and the machine switches to normal heating mode:
  - Condenser temperature (T3) rises above TCDE1+7.2°F (4°C).
  - Condenser temperature (T3) maintained above TCDE2+7.2°F (4°C).
  - Unit runs for 15 minutes consecutively in defrosting mode.

Enhanced defrosting parameter selection entrance:

1. 24V ODU: Determined by the SW1-4 DIP on the 24v transfer board, the DIP code selection OFF uses the default defrosting parameter, and the DIP code selects ON to adjust the following defrosting parameter values.
2. AHU: Enter the engineering mode, select the 27th channel, and set the enhanced defrost.

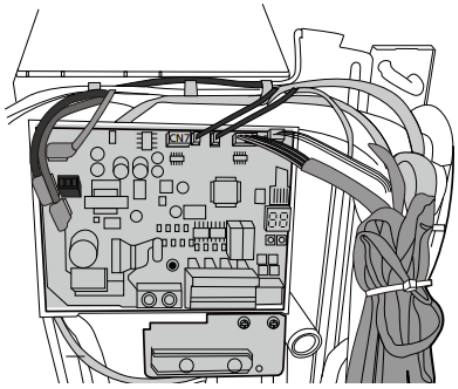
Once your choose enhanced defrosting:
Defrost exit temperature 1: Replace TCDE1 with TCDE1_ADD_STRONG.
Defrost exit temperature 2: Replace TCDE2 with TCDE2_ADD_STRONG.
Defrosting enter condition 7: Compressor Cumulative Running Time: EE_TIME_DEFROST7_ADD with EE_TIME_DEFROST7_STRONG.

4.1 Safety Caution

⚠ WARNING

Be sure to turn off all power supplies or disconnect all wires to avoid electric shock. While checking the indoor/outdoor PCB, please equip yourself with anti-static gloves or a wrist strap to avoid damaging the board.
Electricity will remain in capacitors even when the power supply is off. Ensure the capacitors are fully discharged before troubleshooting

Note: If using the inverter test tool for maintenance, remove the big handle from the unit and connect the inverter test tool to TESTPORT(CN7).



Note: This picture is for reference only. Actual appearance may vary.

4.2 Error Display (Outdoor Unit with Auxiliary Board)

Display	Error Information	Solution
DF	Defrost	Normal display, not error code
FC	Forced cooling	
EC 07	ODU Fan Speed Out of Control	TS12
EC 51	ODU EEPROM Parameter Error	TS10
EC 52	ODU coil temp. sensor (T3) Error	TS14
EC 53	ODU ambient temp. sensor (T4) Error	TS14
EC 54	COMP. Discharge Temp. Sensor (TP) Error	TS14
EC 55	ODU IPM Module Temperature Sensor Malfunction	TS33
EC 57	Refrigerant Pipe Temperature Sensor Error	TS14
EC 5C	Pressure Sensor Error	TS35
EL 01	IDU & ODU Communication Error	TS11
EL 16	Communication Malfunction between Adapter Board and ODU Main Board	TS36
PC 00	IPM Module Protection	TS17
PC 02	Compressor Top(or IPM) Temp. Protection/ Refrigerant Sensor Error	TS25
PC 06	Discharge Temperature protection of compressor	TS23
PC 08	Outdoor Overcurrent Protection	TS15
PC 0A	High Temperature Protection of Condenser	TS24
PC 0F	PFC Module Protection	TS22
PC 10	ODU Low AC Voltage Protection	TS19
PC11	ODU Main Control Board DC Bus High Voltage Protection	TS19
PC 12	ODU Main Control Board DC Bus Low Voltage Protection /341 MCE Error	TS19
PC 30	System High Pressure Protection	TS27
PC31	System Low Pressure Protection	TS29
PC40	Communication Error Between ODU Main Chip and Compressor Driven Chip	TS21
PC 41	Compressor Current Sampling Failure	TS32
PC 42	Compressor Start Failure of Outdoor Unit	TS15
PC 43	ODU Compressor Lack Phase Protection	TS31
PC 44	ODU Zero Speed Protection	TS15
PC 45	ODU IR Chip Drive Failure	TS32
PC 46	Compressor Speed has Been Out of Control	TS15
PC 49	Compressor Overcurrent Failure	TS15
LC 06	High Temperature Protection of Evaporator	TS34
PH 90	High Temperature Protection of Evaporator	TS34
PH 91	Low Temperature Protection of Evaporator	TS35

4.3 Outdoor Unit Point Check Function

- A check switch is included on the auxiliary board.
- Push SW4 to check the unit's status while running. The digital display shows the following codes each time the SW4 is pushed.

Number of Presses	Display	Remark
00	Normal display	Displays running frequency, running state, or malfunction code. Defrosting mode: " dF" or alternative displays between running frequency and "dF" (ach appears for 0.5s.)
01	Indoor unit capacity demand code	Actual data*HP*10 If capacity demand code is higher than 99, light the decimal point of the high digit tube. (For example, the digital display tube show "5.0", so 5.0 multiplied by 10 to become 50, then added to 100 to become 150, so actual capacity demand=150/10=15. The digital display tube show "60", so actual capacity demand=60/10=6.0) GA algorithm models display "--"
02	The frequency after the capacity requirement transfer	If the value is higher than 99, light the decimal point of the high digit tube.
03	Room temperature (T1)	If the temp. is lower than 0°C, the digital display tube will show "0". If the temp. is higher than 70°C, the digital display tube will show "70".
04	Indoor unit evaporator temperature (T2)	If the temp. is lower than -9°C, the digital display tube will show "-9°C". If the temp. is higher than 70°C, the digital display tube will show "70". If the indoor unit is not connected, the digital display tube will show: "--".
05	Condenser pipe temp. (T3)	
06	Outdoor ambient temp. (T4)	
07	Compressor discharge temp. (TP)	The display value is between 0~199°C. if the temp. is lower than 0°C, the digital display tube will show "0". If the temp. is higher than 99°C, light the decimal point of the high digit tube. (For example, the digital display tube show "0.5", so 0.5 multiplied by 10 to become 5 then added to 100 to become 105°C).
08	AD value of current	The display value is a hex number. For example, the digital display tube shows "Cd", so $C*16^1+d*16^0=12*16+13=205$, it meads AD value is 205.
09	AD value of voltage	
10	Indoor unit running mode code	Standby:0, Cooling:1, Heating:2, Fan only:3, Drying:4, Forced cooling:6, Defrost:7, ECO:9, Forced defrosting:A, Self clean:B
11	Outdoor unit running mode code	
12	EXV open angle	Actual data/4 If the value is higher than 99, light the decimal point of the high digit tube. For example, the digital display tube show "2.0", so 2.0 multiplied by 10 to become 20, then added to 100 to become 120, it means the EXV open angle is 120x4=480p.

<table>
<tr><th>Number of Presses</th><th>Display</th><th colspan="3">Remark</th></tr>
<tr><td rowspan="8">13</td><td rowspan="8">Frequency limit symbol</td><td>Bit7</td><td>Frequency limit caused by IGBT radiator</td><td rowspan="8">The display value is hex number. For example, the digital display tube show 2A, the corresponding binary is 101010, so Bit5=1, Bit3=1, and Bit1=1.
It means frequency limit caused by T3, or the current.</td></tr>
<tr><td>Bit6</td><td>Reserved</td></tr>
<tr><td>Bit5</td><td>Reserved</td></tr>
<tr><td>Bit4</td><td>Frequency limit caused by low temperature of T2. (LH00)</td></tr>
<tr><td>Bit3</td><td>Frequency limit caused by T3.(LC01)</td></tr>
<tr><td>Bit2</td><td>Frequency limit caused by TP.(LC02)</td></tr>
<tr><td>Bit1</td><td>Frequency limit caused by current.(LC03)</td></tr>
<tr><td>Bit0</td><td>Frequency limit caused by voltage.(LC05)</td></tr>
<tr><td>14</td><td>Outdoor unit fan speed</td><td colspan="3">If it is higher than 99, light the decimal point of the high digit tube. (For example, the digital display tube show "2.0", so 2.0 multiplied by 10 to become 20, then added to 100 to become 120. This value is multiplied by 8, and is the current fan speed: 120*8=960.</td></tr>
<tr><td>15</td><td>The average value of the temperature values detected by the high and low pressure sensors in the last 10 seconds of the compressor frequency calculation period</td><td colspan="3" rowspan="2">The displayed value is the actual value plus 60 (that is, when the displayed value is 10, the actual value is -50). When the displayed value is higher than 99, light the decimal point of the high digit tube. (If it displays 2.0, so 2.0 multiplied by 10 to become 20, then added to 100 to become 120, the actual value is 60).
When there is no pressure sensor, it is displayed as --.</td></tr>
<tr><td>16</td><td>The temperature value detected by the high and low pressure sensor</td></tr>
<tr><td>17</td><td>AD value detected by the high and low pressure sensor</td><td colspan="3">The display value is a hex number.
For example, the digital display tube shows "Cd", so C*16¹+d*16⁰=12*16+13=205, it meads AD value is 205. When there is no pressure sensor, it is displayed as --.</td></tr>
<tr><td>18</td><td>The currently running communication protocol version</td><td colspan="3">00-99</td></tr>
</table>

4.4 Quick Maintenance by Error Code

If you do not have the time to test which specific parts are faulty, you can directly change the required parts according to the error code. You can find the parts to replace by error code in the following table.

Part Requiring Replacement	Error Code							
	EL01	EC 51	EC52	EC 53	EC 54	EC 55	EC 5C	EC 57
Indoor PCB	√	X	X	X	X	X	X	X
Outdoor PCB	√	√	√	√	√	√	√	√
ODU Coil temp. sensor	X	X	√	X	X	X	X	X
ODU ambient temp. sensor	X	X	X	√	X	X	X	X
COMP. discharge temp. sensor	X	X	X	X	√	X	X	X
IPM module temperature sensor	X	X	X	X	X	√	X	X
Pressure sensor	X	X	X	X	X	X	√	X
Refrigerant pipe temperature sensor	X	X	X	X	X	X	X	√
Condenser temperature sensor	X	X	X	X	X	X	X	X
Reactor	√	X	X	X	X	X	X	X
IPM module board	√	X	X	X	X	X	X	X

Part Requiring Replacement	Error Code								
	EC 07	PC 00	PC 10/ PC 11/ PC 12	PC 02	PC 08/ PC 42/ PC 44/ PC 46/ PC 49	PC 0F	PC 41	PH 90	PH 91
Outdoor PCB	√	√	√	√	√	√	√	X	X
Outdoor Fan Motor	√	√	X	X	√	X	X	X	X
Reactor or inductance	X	√	√	X	√	√	X	X	X
Compressor	X	√	X	X	X	X	X	X	X
IPM module board	X	√	√	X	√	X	X	X	X
Bridge rectifier	X	X	X	X	X	X	X	√	√
Evaporator coil temperature sensor	X	X	X	X	X	√	X	X	X
PFC module	X	X	X	X	X	X	X	X	X
Additional refrigerant	X	X	X	√	X	X	X	X	X
Overload protector	X	X	X	X	X	X	X	X	X
ODU ambient temp. sensor	X	X	X	X	X	X	X	X	X
Refrigerant pipe temperature sensor	X	X	X	X	X	X	X	X	X
Indoor fan	X	X	X	X	X	X	X	√	X
Indoor PCB	X	X	X	X	X	X	X	√	√

Part Requiring Replacement	Error Code							
	PC 40	PC 43	PC 45	PC 06	PC 0A	PC 30	PC 31	EL 16
Outdoor PCB	√	√	X	√	√	√	√	√
Outdoor Fan Motor	X	X	X	X	√	√	√	X
ODU coil temp. sensor	X	X	X	X	√	X	X	X
COMP. discharge temp. sensor	X	X	X	√	X	X	X	X
Compressor	X	√	X	X	X	X	X	X
IPM module board	X	X	√	X	X	X	X	X
Additional refrigerant	X	X	X	√	√	X	√	X
Electric control box	√	X	X	X	X	X	X	X
High pressure switch	X	X	X	X	X	√	X	X
Low pressure switch	X	X	X	X	X	X	√	X
Adapter board	X	X	X	X	X	X	X	√

4.5 Troubleshooting by Error Code

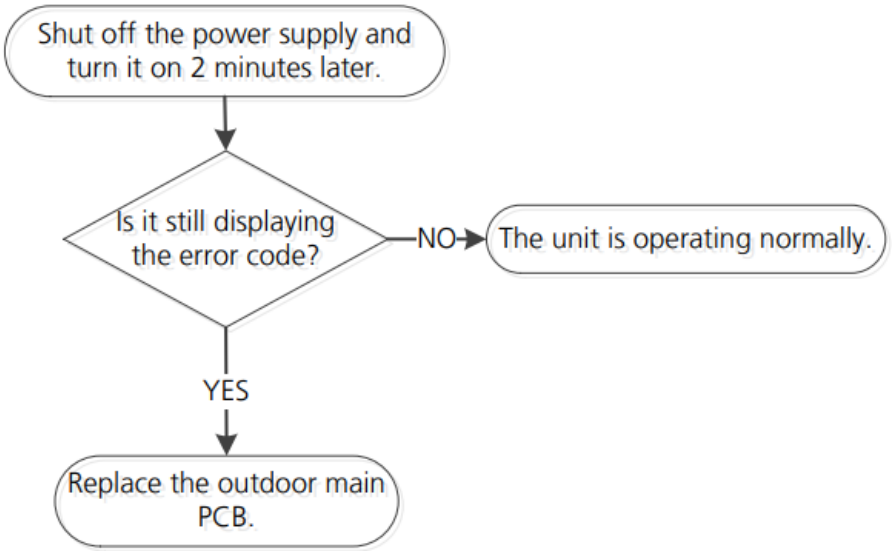
EC 51: ODU EEPROM parameter error diagnosis and solution:

Description: Indoor or outdoor PCB main chip does not receive feedback from EEPROM chip..

Recommended parts to prepare:

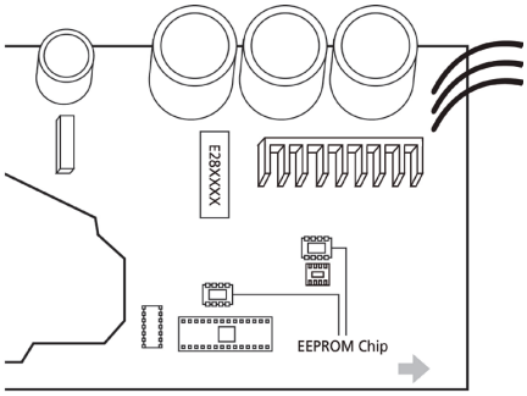
- Indoor PCB
- Outdoor PCB

Troubleshooting and repair:



Remarks:

EEPROM: A read-only memory whose contents can be erased and reprogrammed using a puled voltage. The location of the EEPROM chip on the indoor PCB is shown in the following image:



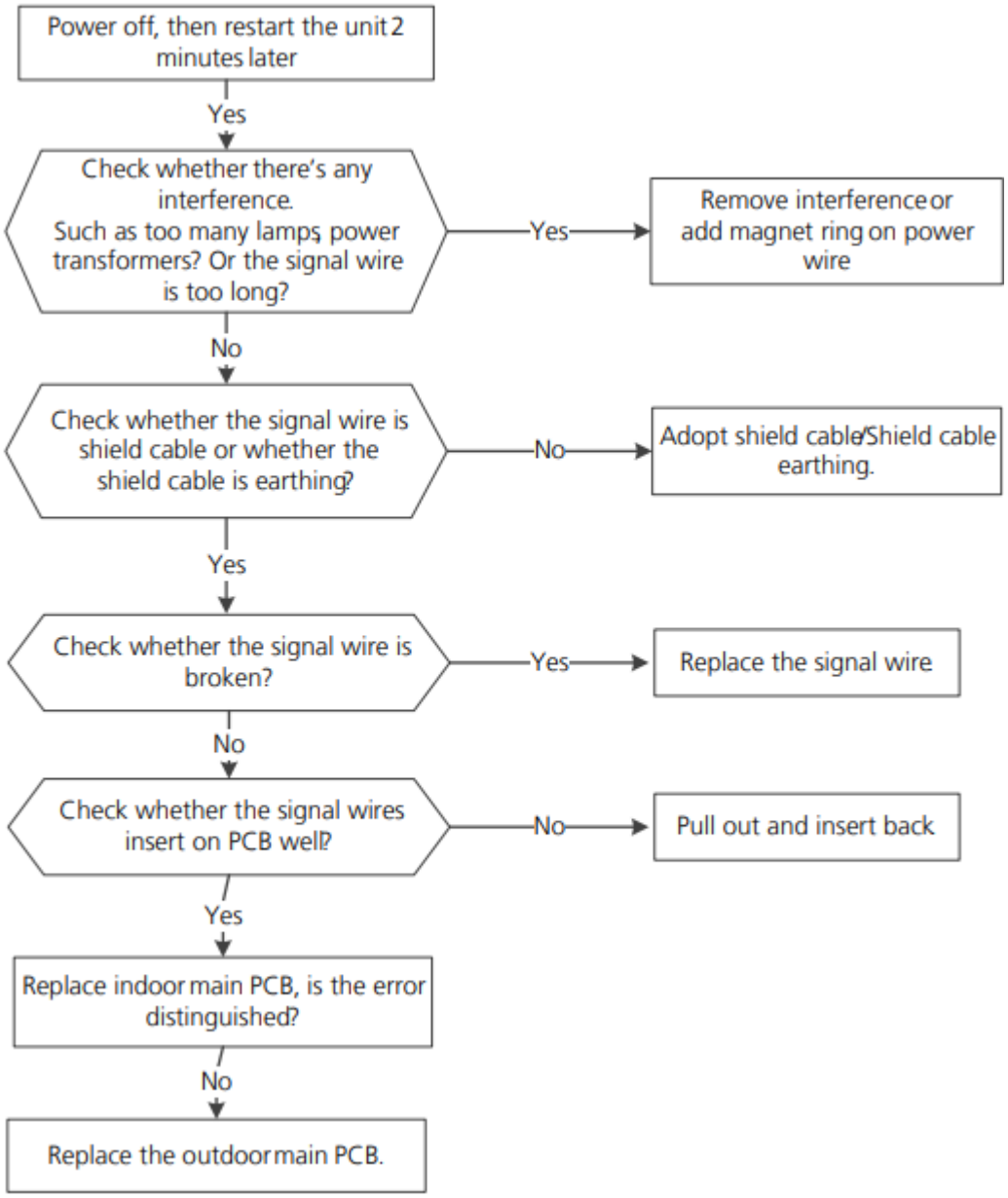
Note: These pictures are for reference, actual appearance may vary.

EL 01: IDU & ODU communication error diagnosis and solution

Recommended parts to prepare:

- Indoor PCB
- Outdoor PCB
- Signal wires
- Magnet ring

Troubleshooting and repair:



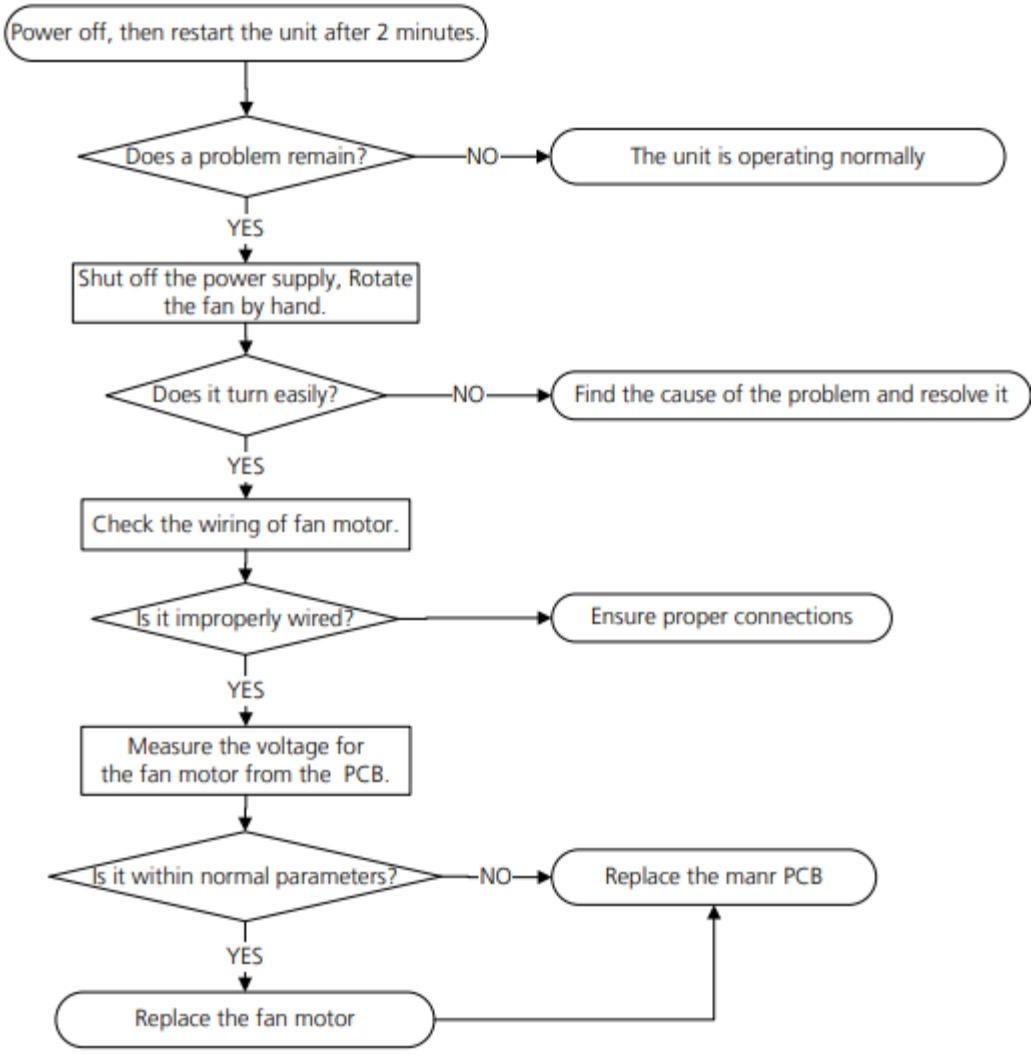
EC 07: ODU fan speed out of control diagnosis and solution

Description: When indoor/outdoor fan speed keeps too low or too high for a certain time, the LED displays the failure code and the AC turns off.

Recommended parts to prepare:

- Connection wires
- Fan assembly
- Fan motor
- PCB

Troubleshooting and repair:



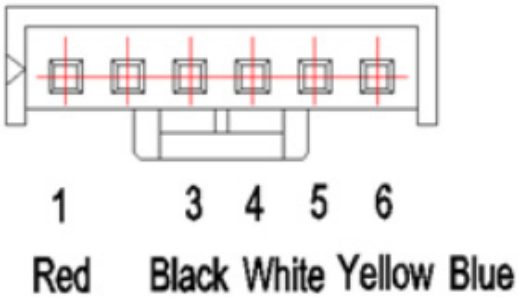
Index:

1. Outdoor DC fan motor (control chip is in fan motor)

Power on and make sure the unit is in standby, measure the voltage of pin1-pin3, pin4-pin3 on the fan motor connector. If the value of the voltage is not in the range showing in the tables below, the PCB will have problems and will need to be replaced.

DC motor voltage input and output (voltage: 220-240V~)

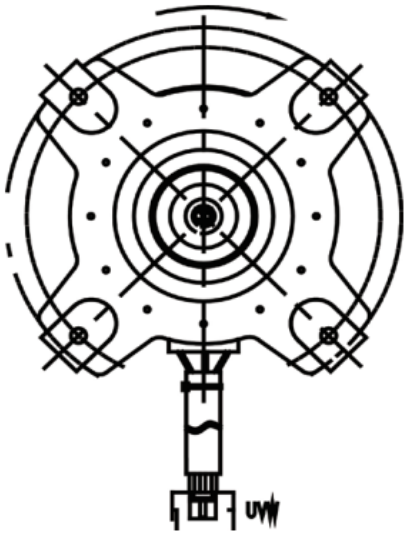
NO.	Color	Signal	Voltage
1	Red	Vs/Vm	192V~380V
2	---	---	---
3	Black	GND	0V
4	White	Vcc	13.5-16.5V
5	Yellow	Vsp	0~6.5V
6	Blue	FG	13.5-16.5V



Index:

1. Outdoor DC fan motor (control chip is in outdoor PCB)

Release the UVW connector and measure the resistance of U-V, U-W, V-W. If the resistance is not equal to each other the fan motor has a problem and needs to be replaced. Otherwise the PCB has a problem and needs to be replaced.



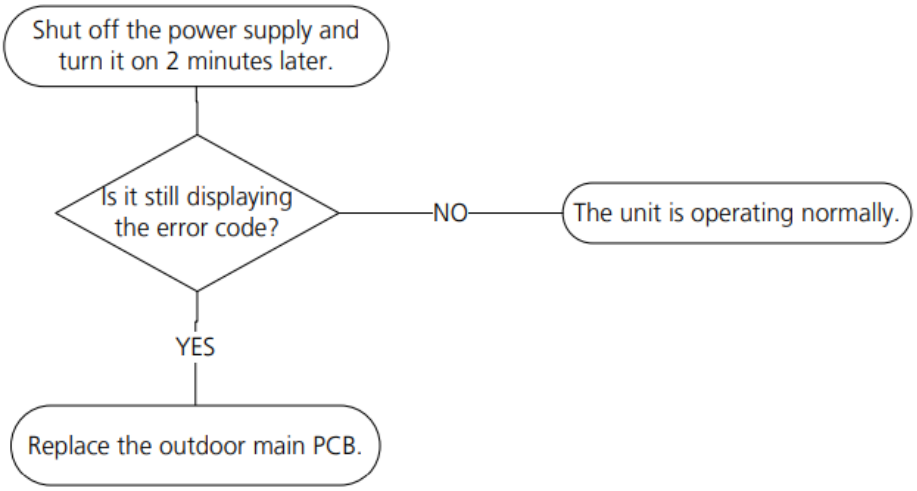
EC 52/EC 53/EC 54/EC 57: Open circuit or short circuit of temperature sensor diagnosis and solution

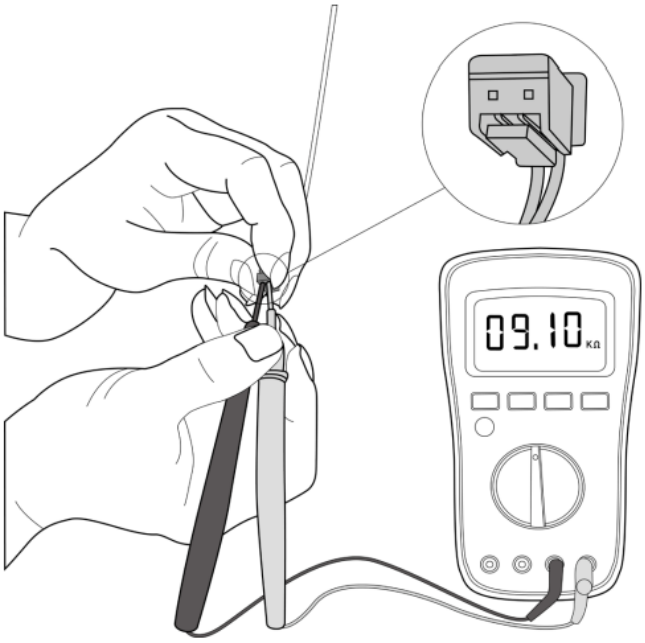
Description: If the sampling voltage is lower than 0.06V or higher than 4.94V, the LED displays the failure code.

Recommended parts to prepare:

- Connection wires
- Outdoor PCB
- Sensors

Troubleshooting and repair:





Note: The picture and the value are for reference only, actual appearance and values may vary.

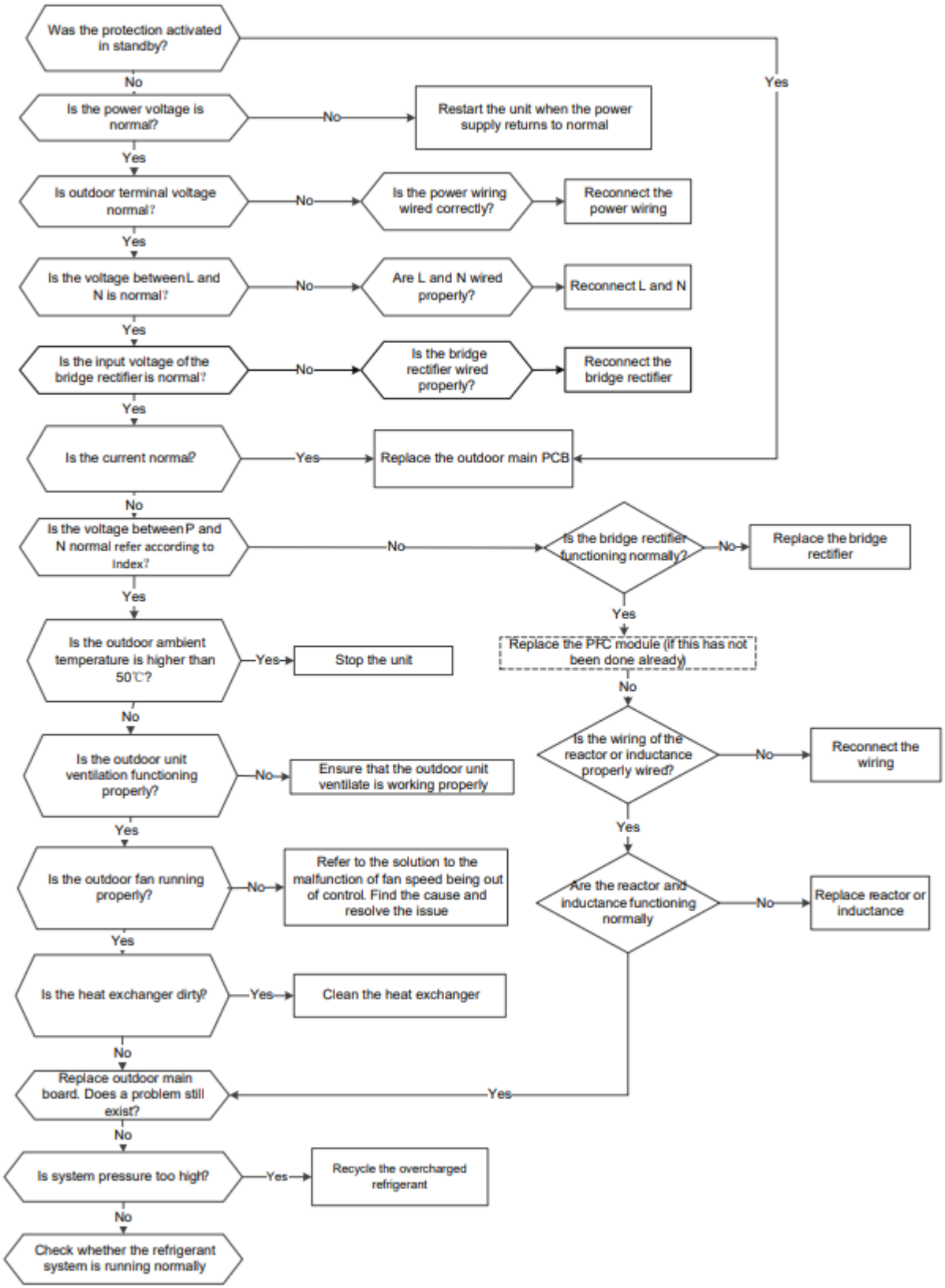
PC 08: Current overload protection/ PC 42: Compressor start failure of outdoor unit/ PC 44: ODU zero speed protection/ PC 46: Compressor speed has been out of control/ PC 49: compressor overcurrent failure

Description: An abnormal current rise is detected by checking the specified current detection circuit.

Recommended parts to prepare:

- Outdoor PCB
- Connection wires
- Bridge rectifier
- PFC circuit or reactor
- Refrigeration piping system
- Pressure switch
- Outdoor fan
- IPM module board

Troubleshooting and repair:


Was the protection activated in standby?
Yes
No
Is the power voltage is normal?
No
Restart the unit when the power supply returns to normal
Yes
Is outdoor terminal voltage normal?
No
Is the power wiring wired correctly?
Reconnect the power wiring
Yes
Is the voltage between L and N is normal?
No
Are L and N wired properly?
Reconnect L and N
Yes
Is the input voltage of the bridge rectifier is normal?
No
Is the bridge rectifier wired properly?
Reconnect the bridge rectifier
Yes
Is the current normal?
Yes
Replace the outdoor main PCB
No
Is the voltage between P and N normal refer according to Index?
No
Is the bridge rectifier functioning normally?
No
Replace the bridge rectifier
Yes
Yes
Is the outdoor ambient temperature is higher than 50℃?
Yes
Stop the unit
Replace the PFC module (if this has not been done already)
No
No
Is the outdoor unit ventilation functioning properly?
No
Ensure that the outdoor unit ventilate is working properly
Is the wiring of the reactor or inductance properly wired?
No
Reconnect the wiring
Yes
Yes
Is the outdoor fan running properly?
No
Refer to the solution to the malfunction of fan speed being out of control. Find the cause and resolve the issue
Are the reactor and inductance functioning normally
No
Replace reactor or inductance
Yes
Is the heat exchanger dirty?
Yes
Clean the heat exchanger
No
Replace outdoor main board. Does a problem still exist?
Yes
No
Is system pressure too high?
Yes
Recycle the overcharged refrigerant
No
Check whether the refrigerant system is running normally

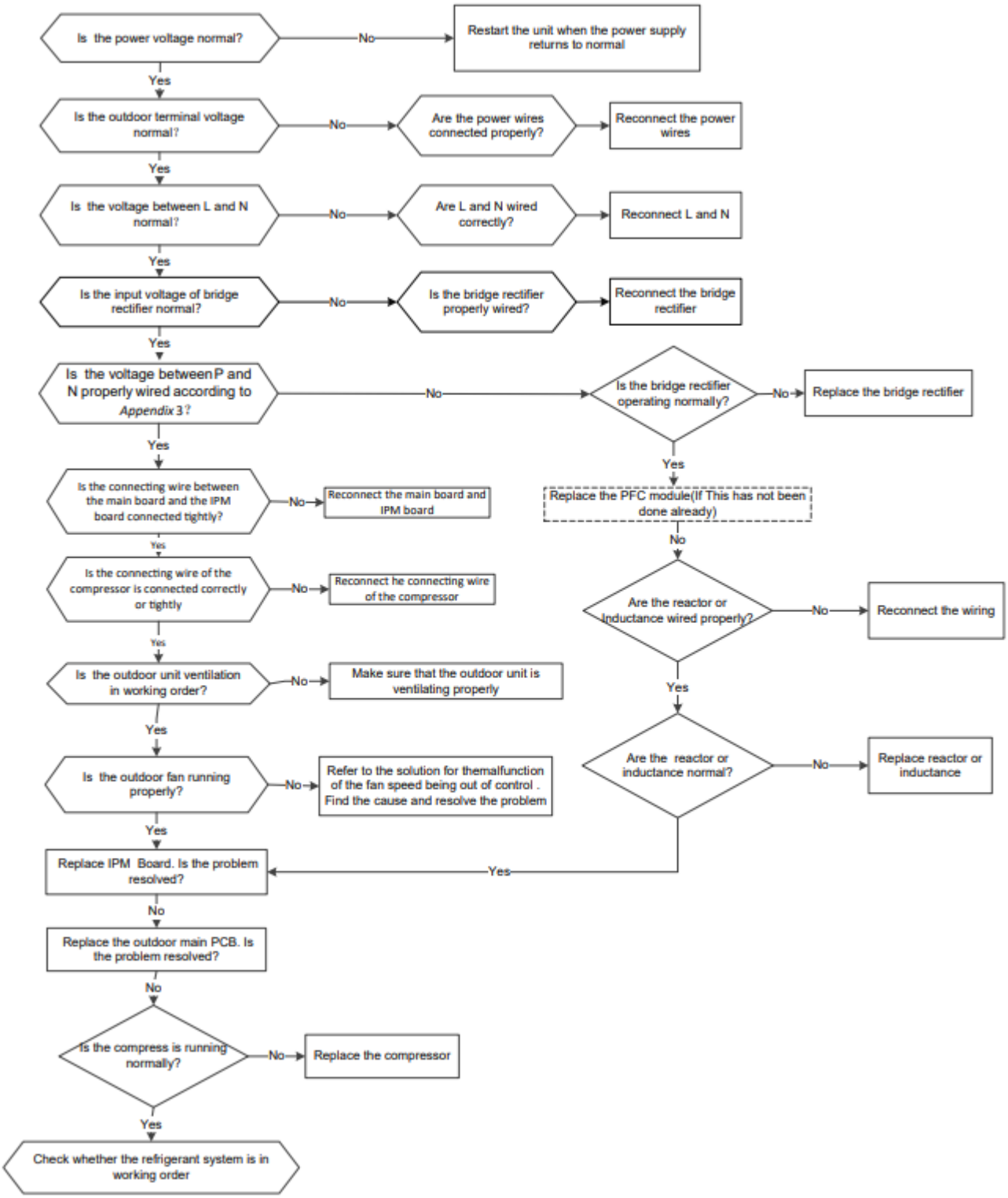
PC 00: IPM malfunction diagnosis and solution

Description: When the voltage signal the IPM sends to the compressor drive chip is abnormal, the LED displays the failure code and the AC turns off.

Recommended parts to prepare:

- Connection wires
- IPM module board
- Outdoor fan assembly
- Compressor
- Outdoor PCB
- Reactor or inductance
- Bridge rectifier

Troubleshooting and repair: At first test the resistance between every two ports of U, V, W, of IPM and P,N. If any result of them is 0 or close to 0, the IPM is defective. Otherwise please follow the procedure below:


Is the power voltage normal?
No
Restart the unit when the power supply returns to normal
Yes
Is the outdoor terminal voltage normal?
No
Are the power wires connected properly?
Reconnect the power wires
Yes
Is the voltage between L and N normal?
No
Are L and N wired correctly?
Reconnect L and N
Yes
Is the input voltage of bridge rectifier normal?
No
Is the bridge rectifier properly wired?
Reconnect the bridge rectifier
Yes
Is the voltage between P and N properly wired according to Appendix 3?
No
Is the bridge rectifier operating normally?
No
Replace the bridge rectifier
Yes
Is the connecting wire between the main board and the IPM board connected tightly?
No
Reconnect the main board and IPM board
Replace the PFC module(If This has not been done already)
Yes
Is the connecting wire of the compressor is connected correctly or tightly
No
Reconnect he connecting wire of the compressor
No
Are the reactor or inductance wired properly?
No
Reconnect the wiring
Yes
Is the outdoor unit ventilation in working order?
No
Make sure that the outdoor unit is ventilating properly
Yes
Are the reactor or inductance normal?
No
Replace reactor or inductance
Yes
Is the outdoor fan running properly?
No
Refer to the solution for themalfunction of the fan speed being out of control . Find the cause and resolve the problem
Yes
Replace IPM Board. Is the problem resolved?
Yes
No
Replace the outdoor main PCB. Is the problem resolved?
No
Is the compress is running normally?
No
Replace the compressor
Yes
Check whether the refrigerant system is in working order

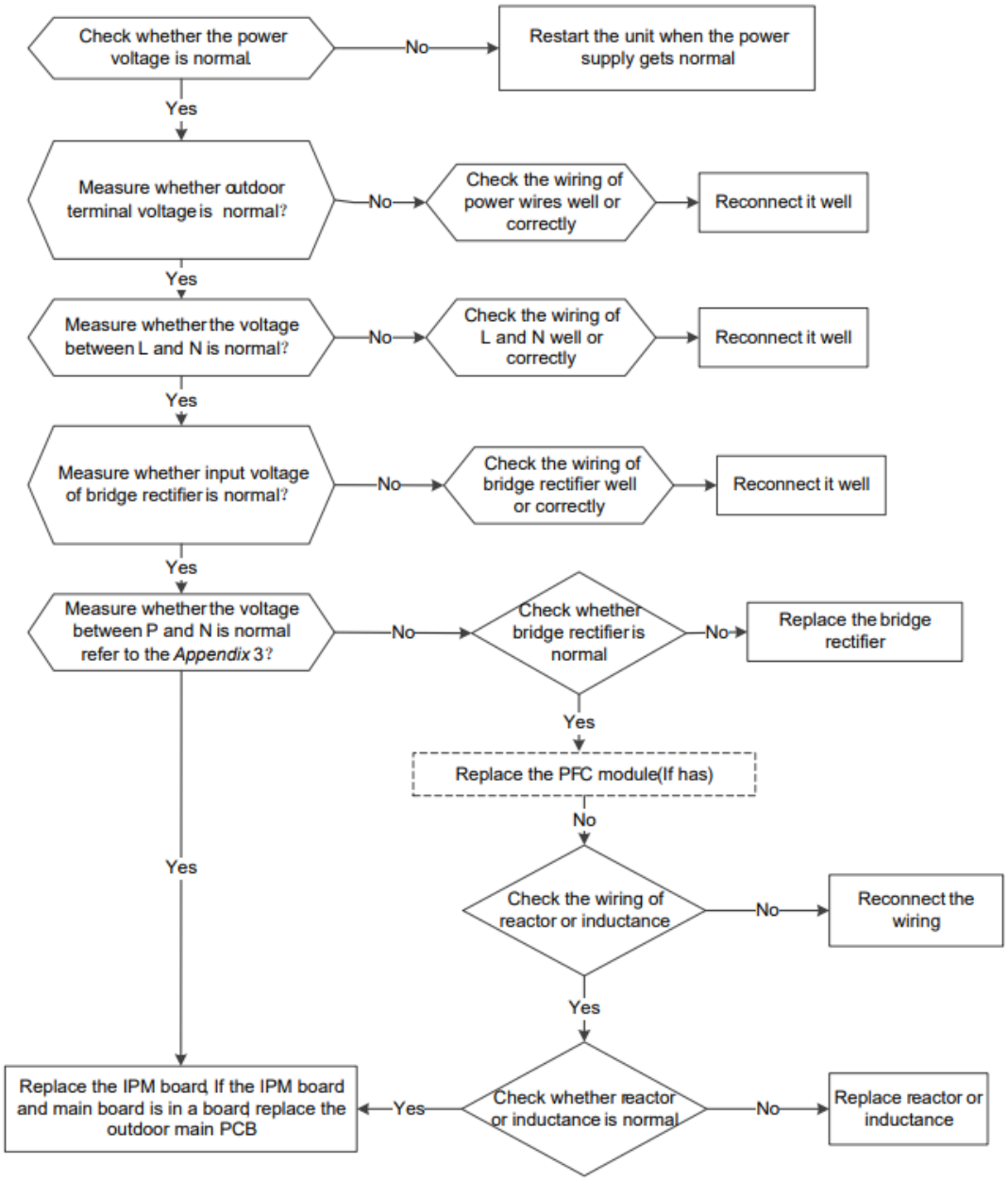
PC 10: ODU low AC voltage protection/ PC 11: ODU main control board DC bus high voltage protection/ PC 12: ODU main control board DC bus low voltage protection/341 MCE error diagnosis and solution

Description: Abnormal increases or decreases in voltage are detected by checking the specified voltage detection circuit.

Recommended parts to prepare:

- Power supply wires
- IPM module board
- Outdoor PCB
- Bridge rectifier
- PFC circuit or reactor

Troubleshooting and repair:



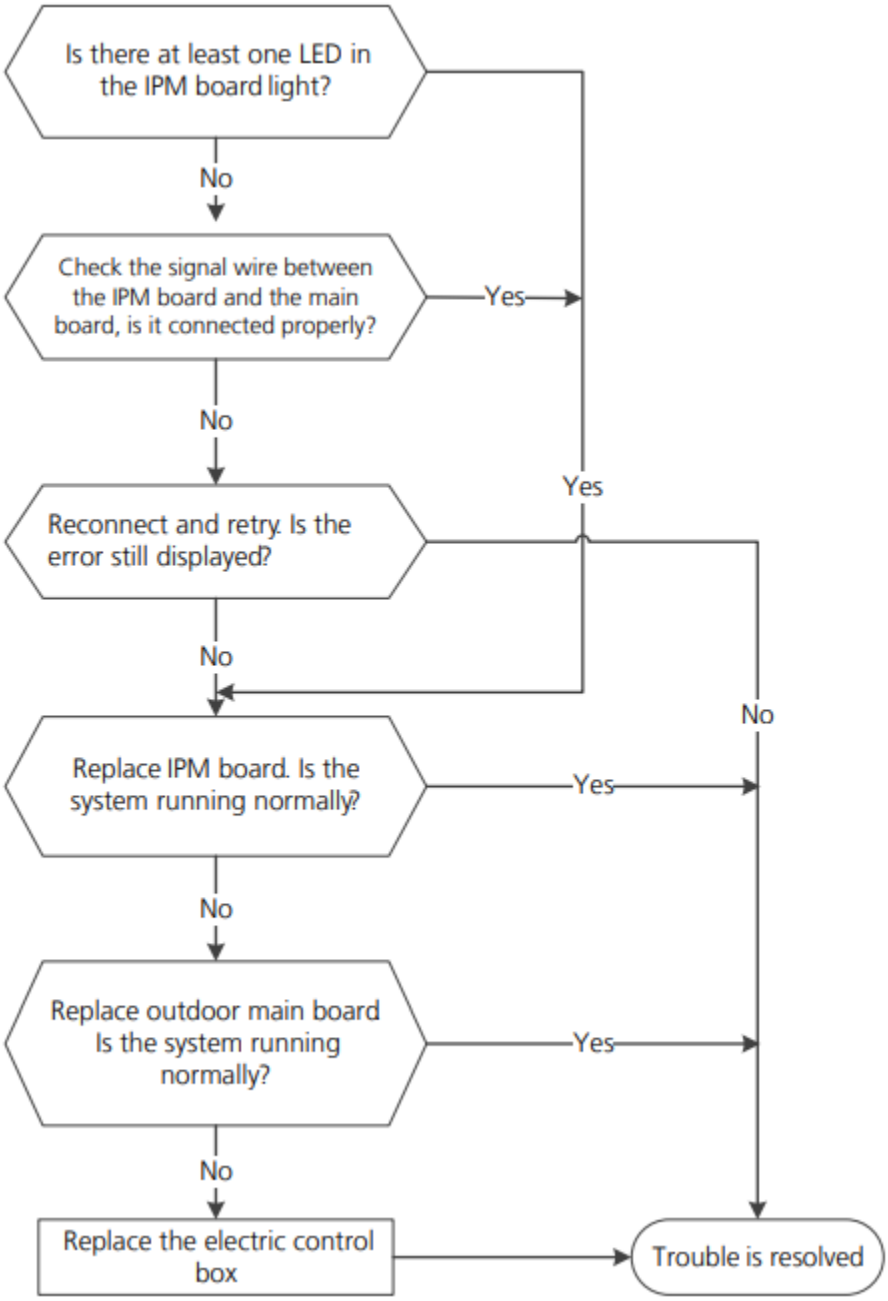
PC 40: Communication error between ODU main chip and compressor driven chip diagnosis and solution

Description: The main PCB cannot detect the IPM board.

Recommended parts to prepare:

- Connection wires
- Outdoor PCB
- IPM module board
- Electric control box

Troubleshooting and repair:



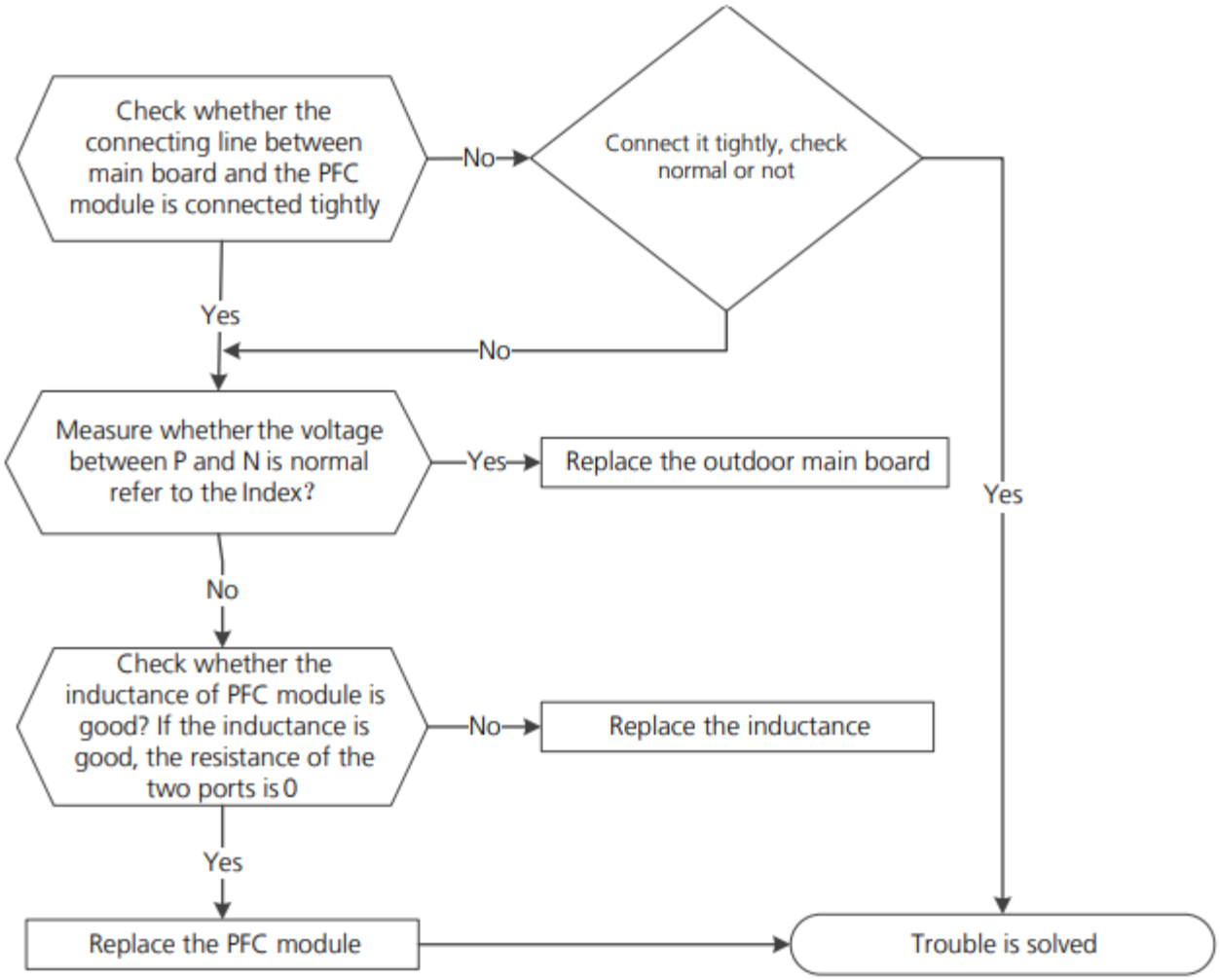
PC 0F: PFC module protection diagnosis and solution

Description: Outdoor PCB detects PFC signal is low voltage or DC voltage is lower than 340V for 6s when quick check.

Recommended parts to prepare:

- Connection wires
- Outdoor PCB
- Inductance
- PFC circuit or IPM module board

Troubleshooting and repair:



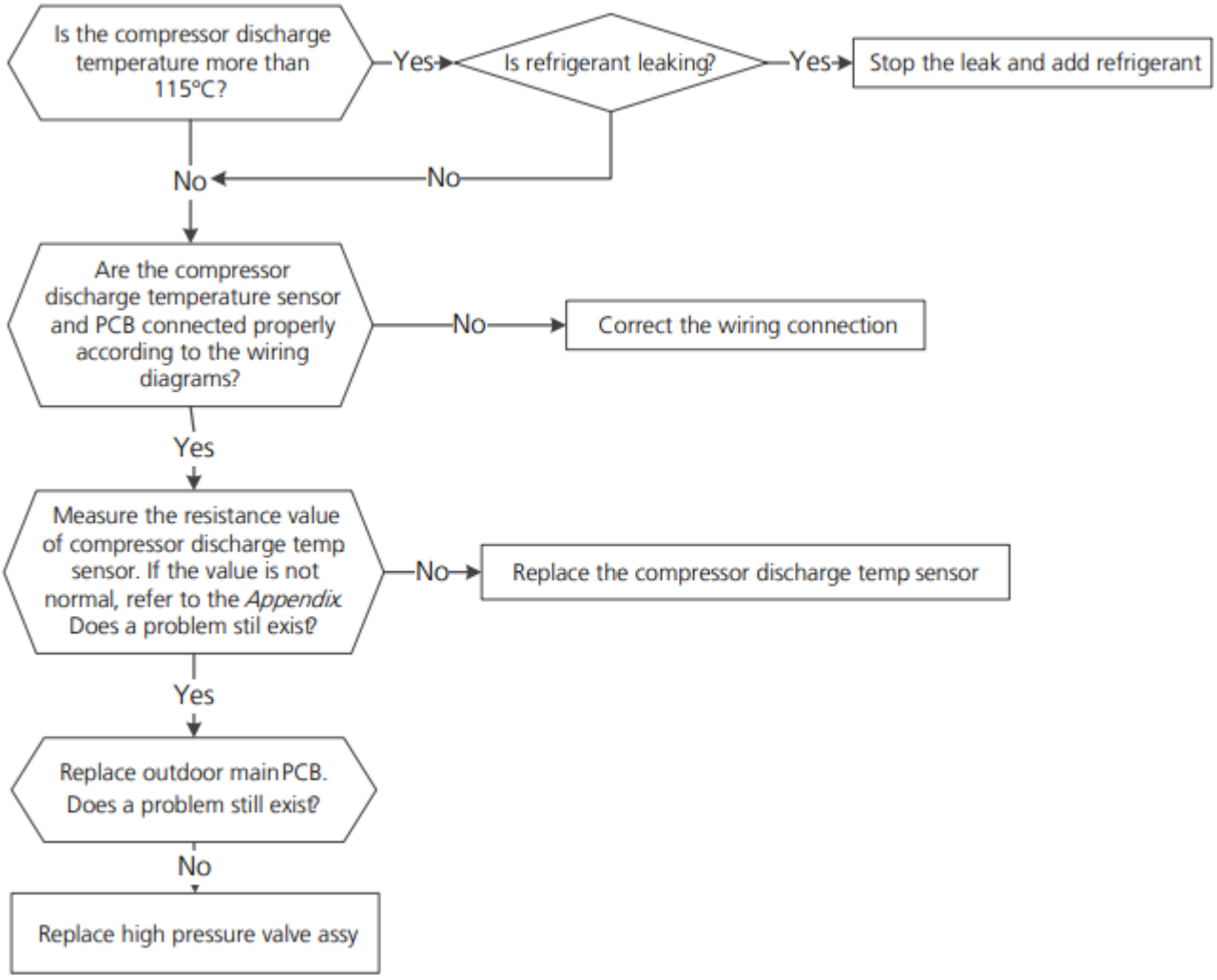
PC 06: Discharge temperature protection of compressor diagnosis and solution

Description: When the compressor discharge temperature (TP) is more than 115°C for 10 seconds, the compressor ceases operation and does not restart until TP is less than 90°C..

Recommended parts to prepare:

- Connection wires
- Outdoor PCB
- Discharge temperature sensor
- Refrigerant

Troubleshooting and repair:



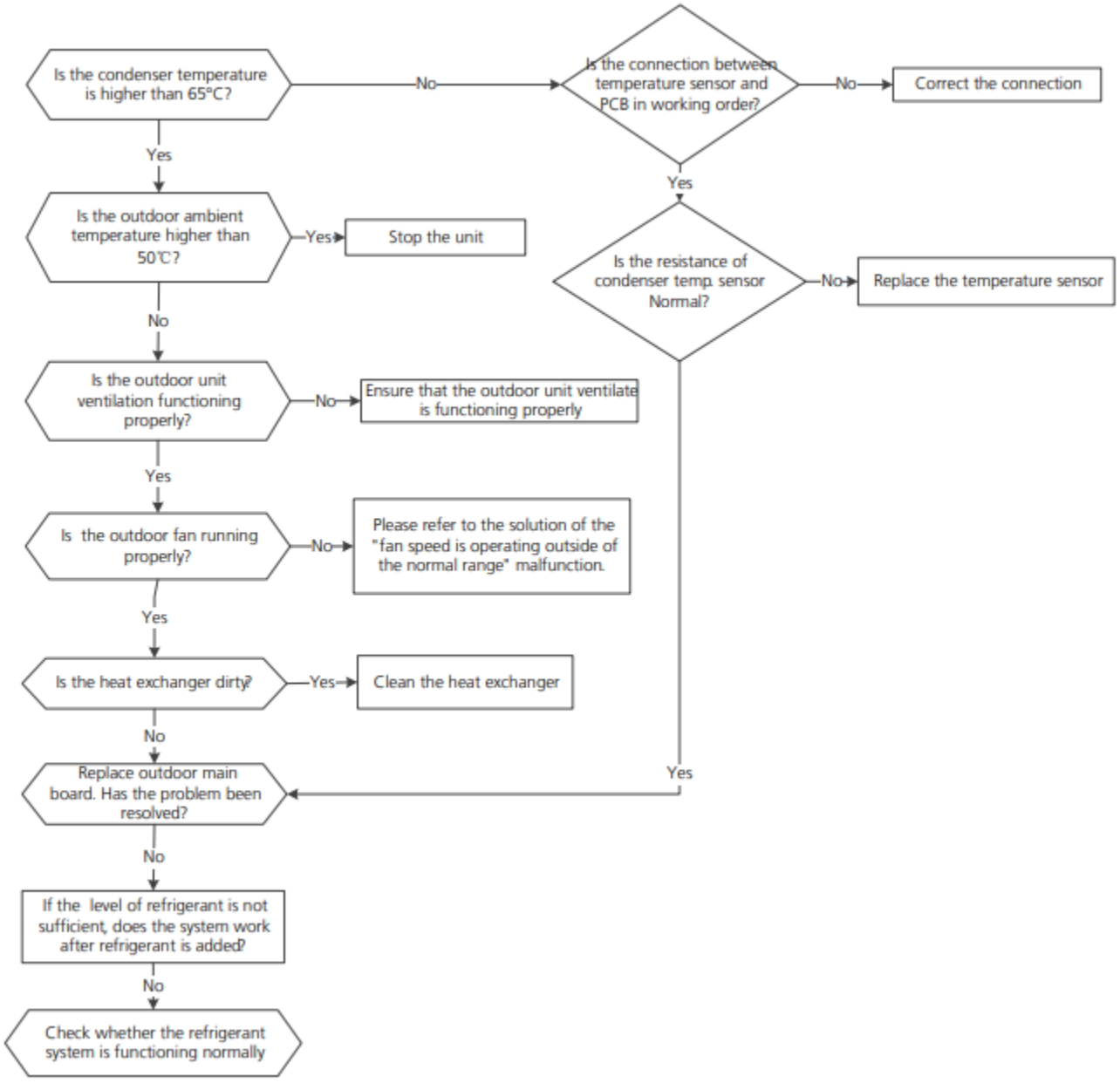
PC 0A: High temperature protection of condenser diagnosis and solution

Description: The unit will stop when condenser temperature is higher than 65°C, and runs again when it is less than 50°C.

Recommended parts to prepare:

- Connection wires
- Condenser temperature sensor
- Outdoor fan
- Outdoor main PCB
- Refrigerant

Troubleshooting and repair:



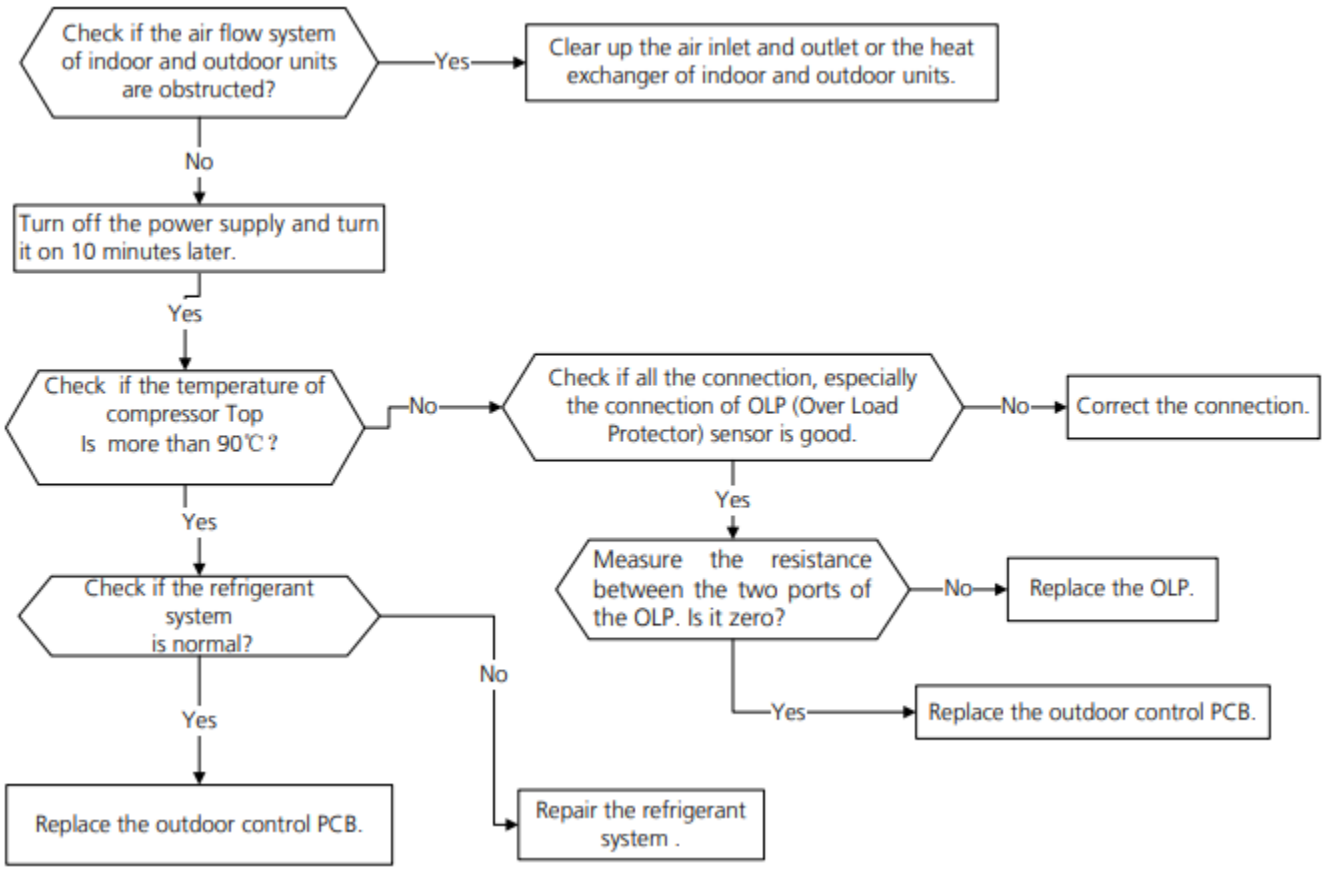
PC 02/ LC 06: Compressor top (or IPM) temp. protection/Refrigerant sensor error diagnosis and solution

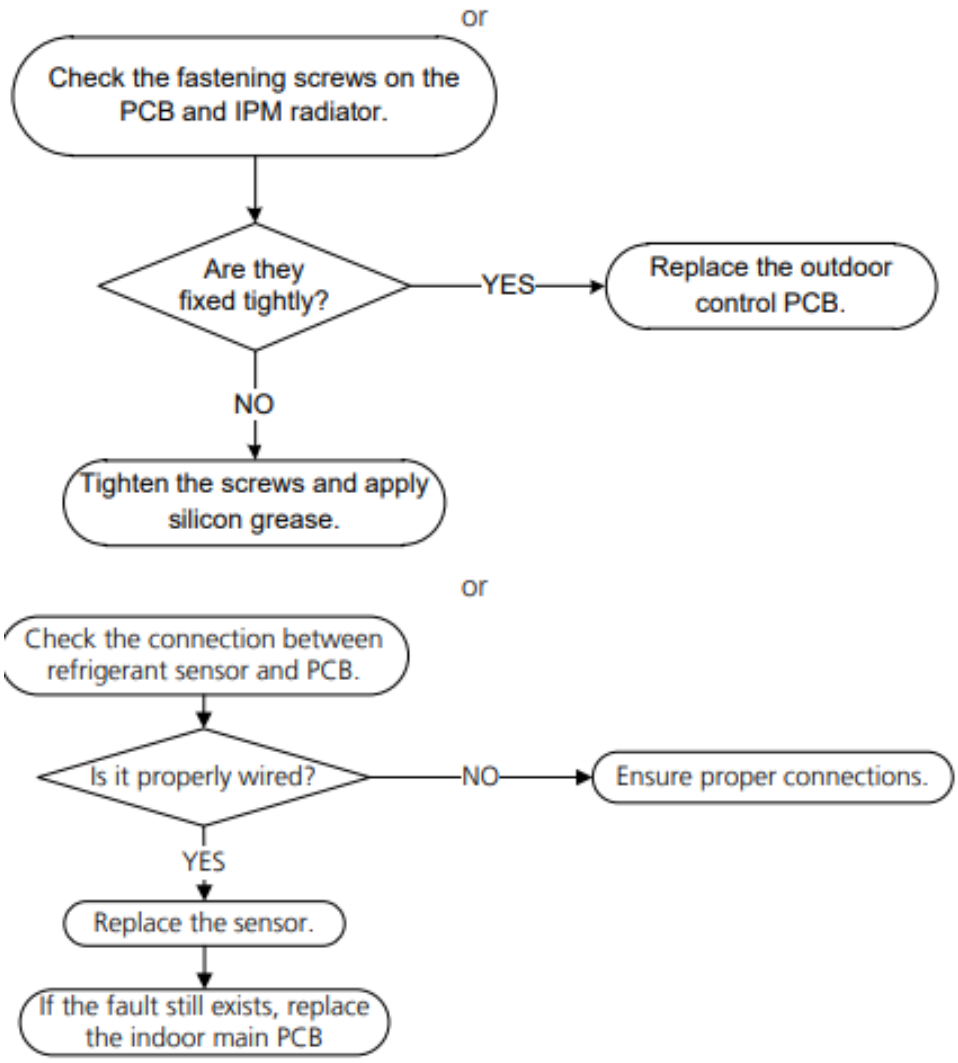
Description: For some models with a overload protector, if the sampling voltage is not 5V, the LED will display the failure. If the temperature of the IPM module is higher than a certain value, the LED displays the failure code. Models without overload protector should be diagnosed according to the second flowchart.

Recommended parts to prepare:

- Connection wires
- Outdoor PCB
- IPM module board
- High pressure protector
- System blockages

Troubleshooting and repair:




or
Check the fastening screws on the PCB and IPM radiator.
Are they fixed tightly?
YES
Replace the outdoor control PCB.
NO
Tighten the screws and apply silicon grease.
or
Check the connection between refrigerant sensor and PCB.
Is it properly wired?
NO
Ensure proper connections.
YES
Replace the sensor.
If the fault still exists, replace the indoor main PCB

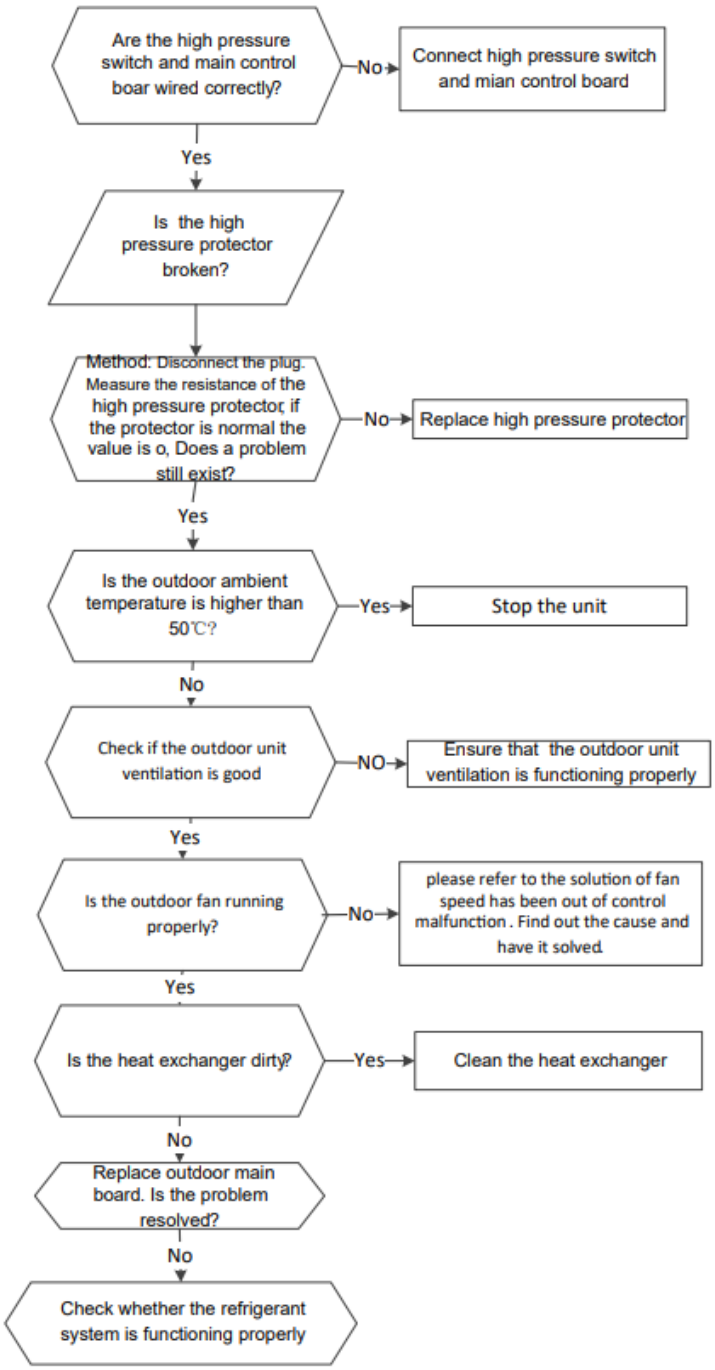
PC 30: System high pressure protection diagnosis and solution

Description: Outdoor pressure switch cuts off the system because pressure is higher than 638PSI (4.4MPa).

Recommended parts to prepare:

- Connection wires
- Pressure switch
- Outdoor fan
- Outdoor main PCB

Troubleshooting and repair:



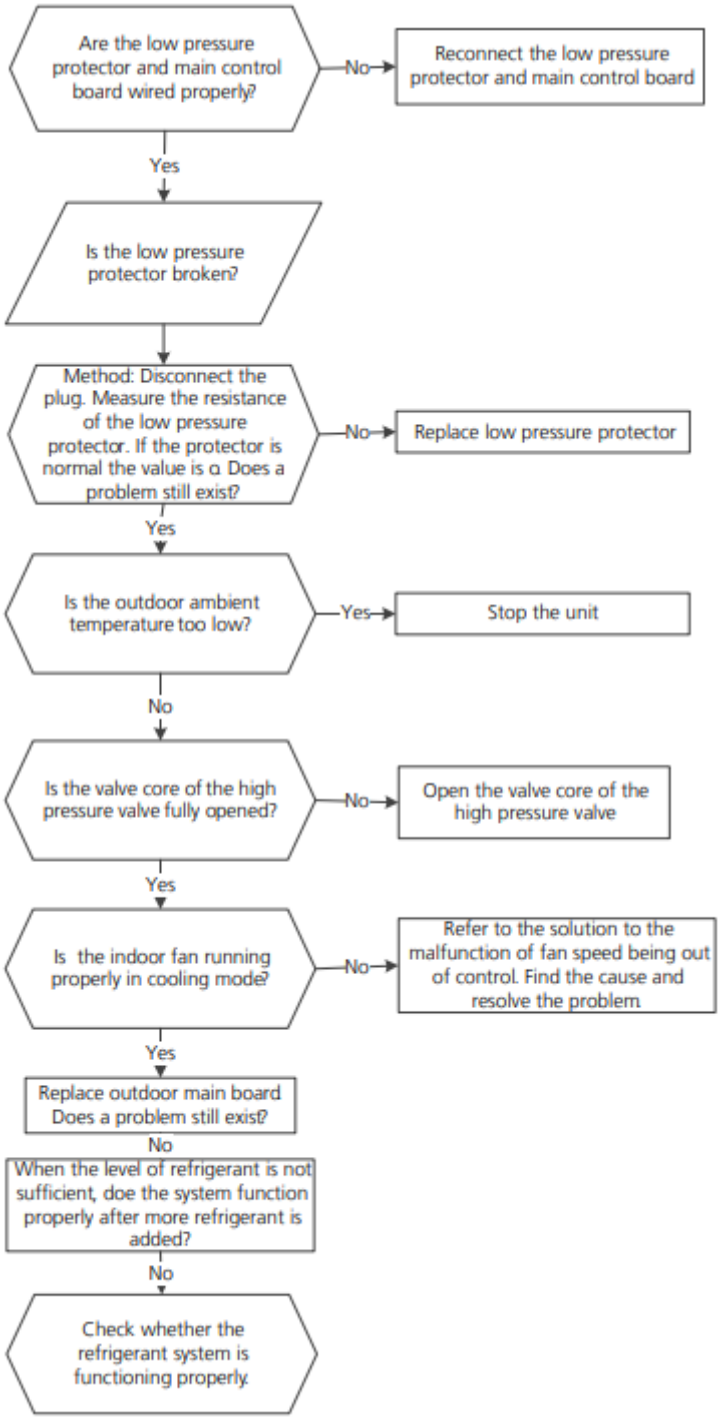
PC 31: System low pressure protection diagnosis and solution

Description: Outdoor pressure switch cut off the system because low pressure is lower than 18.85PSI (0.13MPa), the LED displays the failure code.

Recommended parts to prepare:

- Connection wires
- Outdoor PCB
- Low pressure protector
- Refrigerant

Troubleshooting and repair:



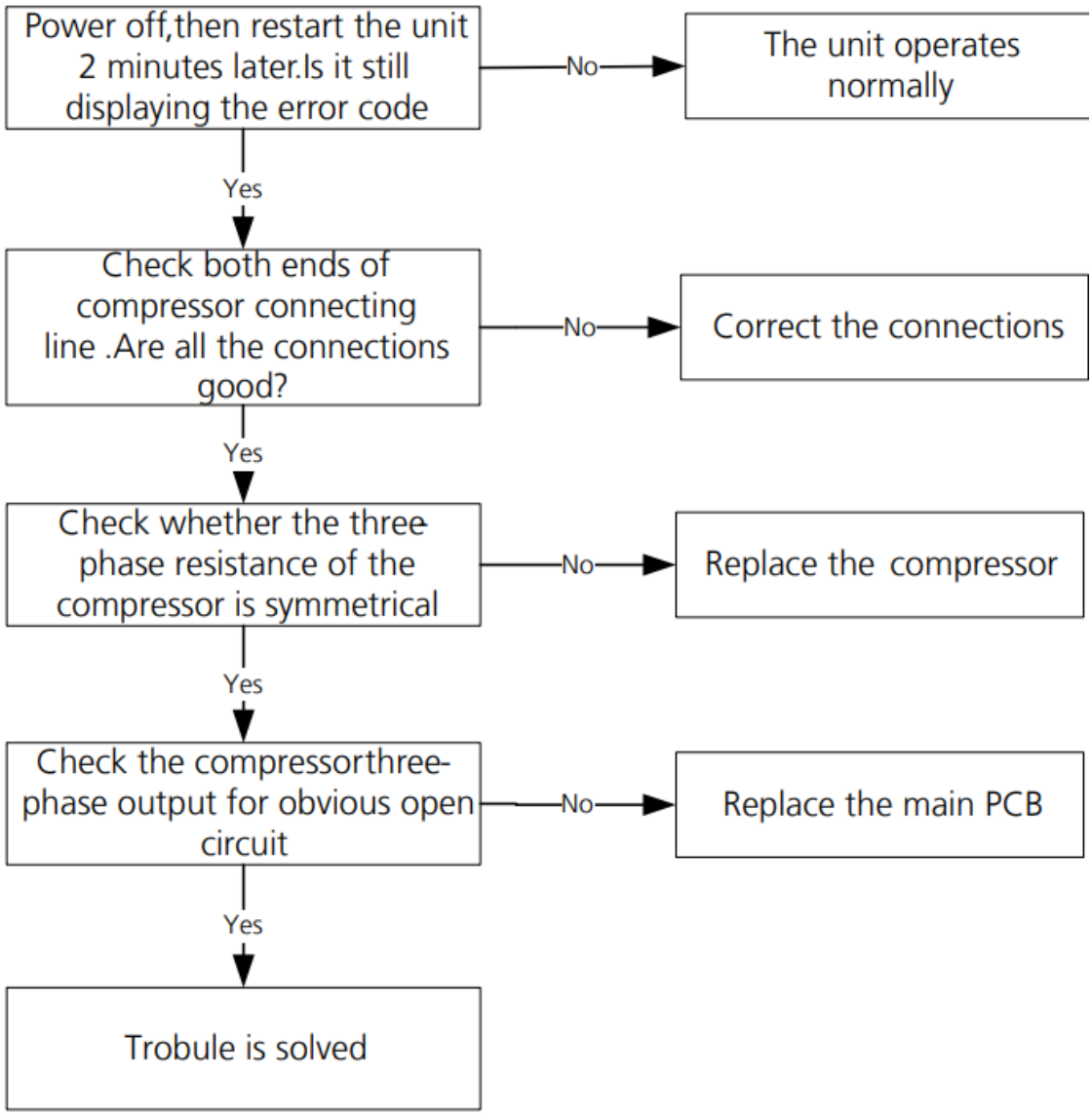
PC 43: ODU compressor lack phase protection diagnosis and solution

Description: When the three-phase sampling current of the compressor is abnormal, especially when the current of one or more phases is always small and almost 0, the LED displays the failure code.

Recommended parts to prepare:

- Connection wires
- Compressor
- Outdoor PCB

Troubleshooting and repair:



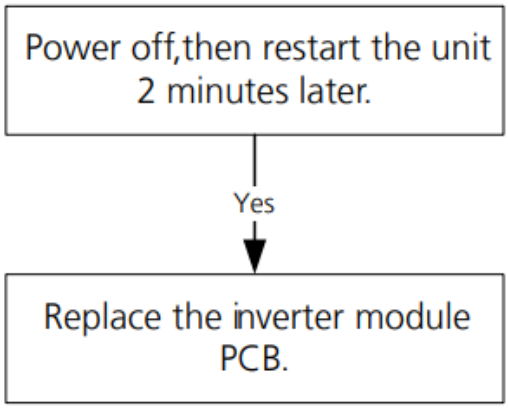
PC 45: ODU IR chip drive failure diagnosis and solution

Description: When the IR chip detects its own parameter error, the LED displays the failure code when power is on.

Recommended parts to prepare:

- Inverter module PCB

Troubleshooting and repair:



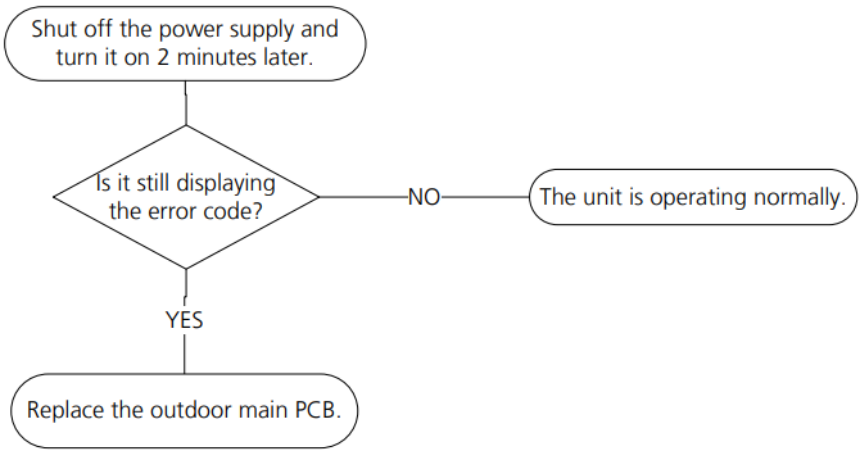
PC 41: Outdoor compressor current sampling circuit failure diagnosis and solution

Description: Three-phase sampling offset voltage error, the static bias voltage is normally 2.5V.

Recommended parts to prepare:

- Outdoor main PCB

Troubleshooting and repair:



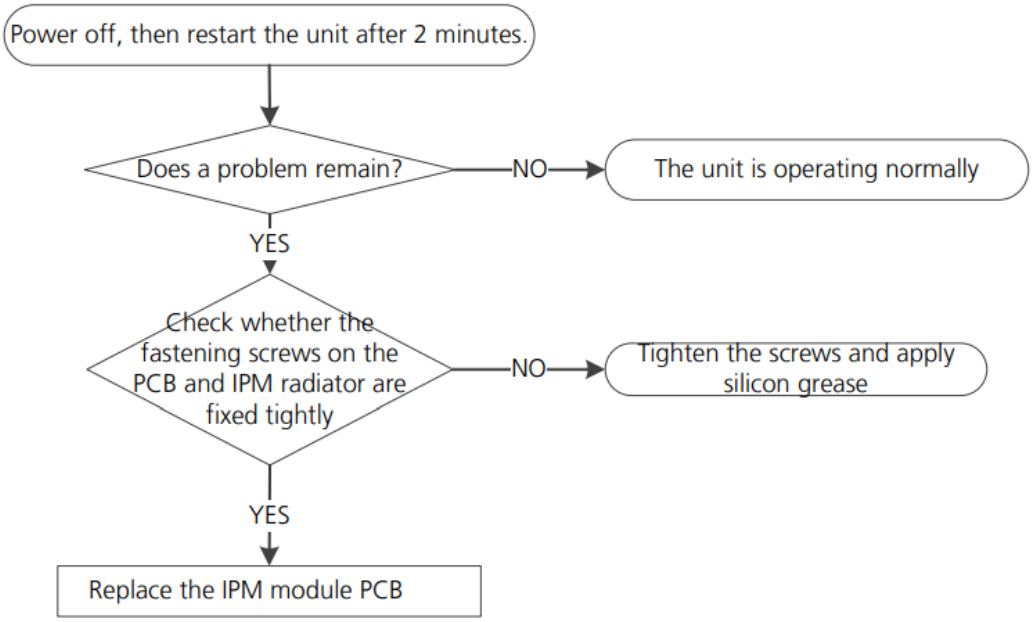
EC 55: ODU IPM module temperature sensor malfunction diagnosis and solution

Description: If the sampling voltage is 0V or 5V, the LED displays the failure code.

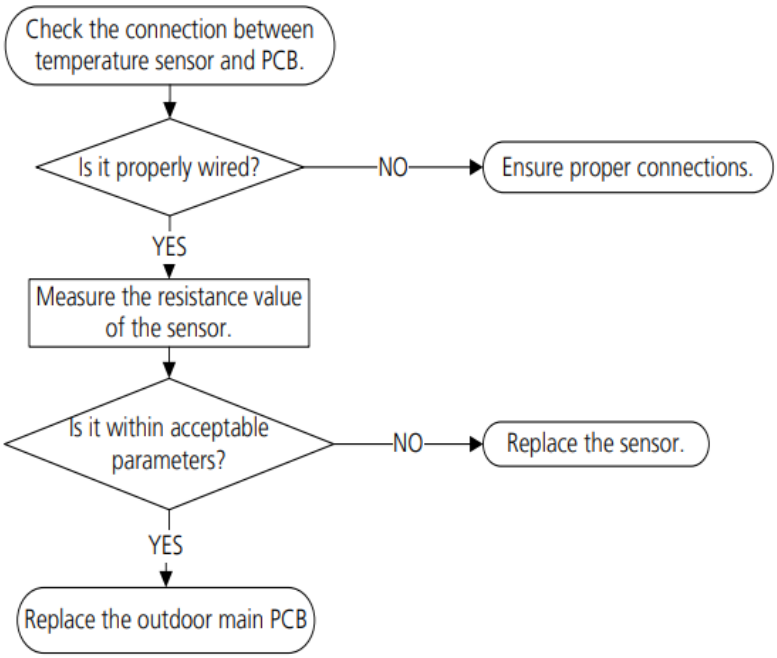
Recommended parts to prepare:

- IPM module PCB
- Connection wires
- Sensors
- Outdoor main PCB

Troubleshooting and repair: If the radiator has no sensor, follow the steps below to resolve.



If the radiator has a sensor (TH), follow the steps below.



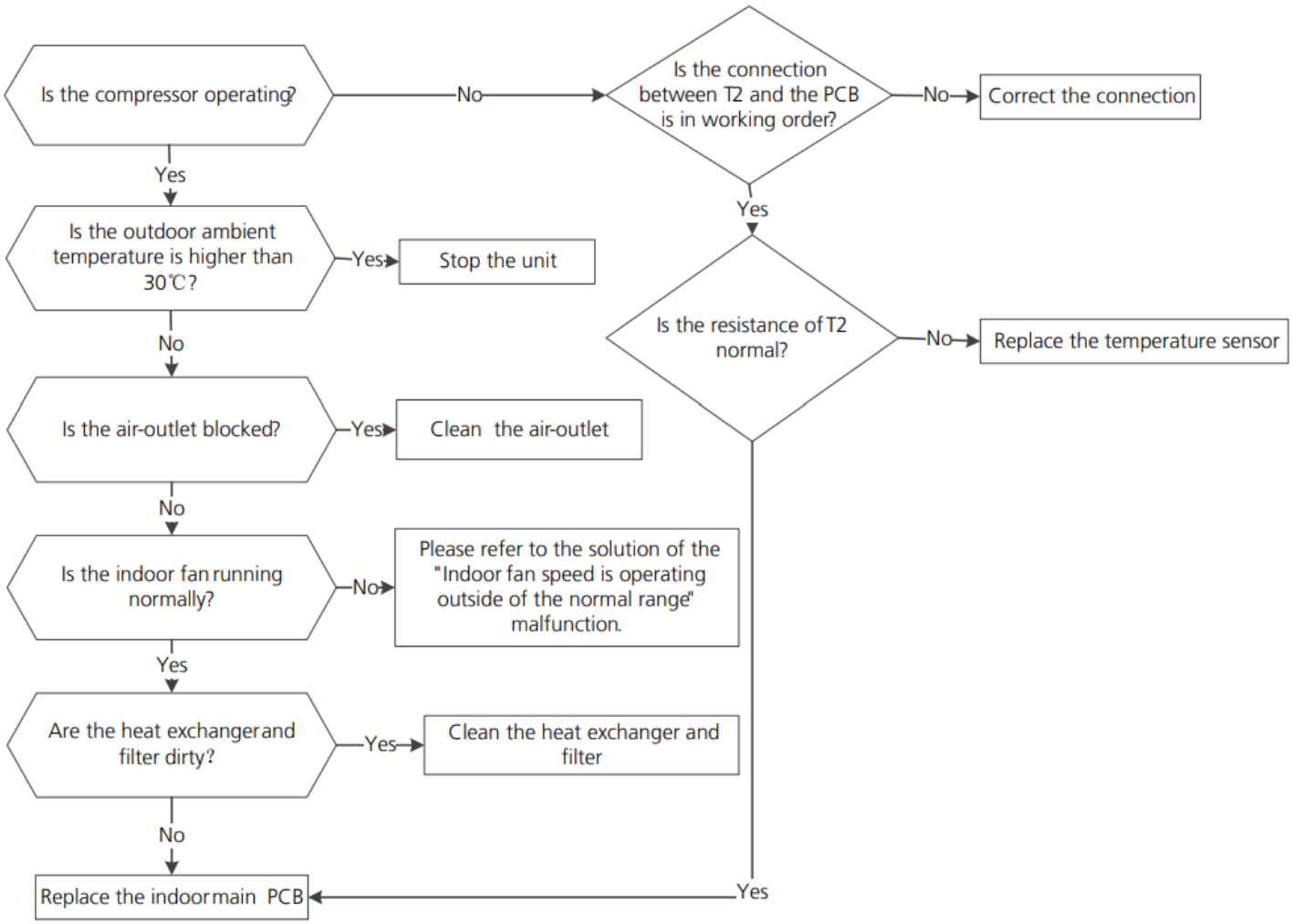
PH 90: High temperature protection of evaporator diagnosis and solution

Description: When evaporator coil temperature is more than 60°C in heating mode, the unit stops. It starts again only when the evaporator coil temperature is less than 52°C.

Recommended parts to prepare:

- Connection wires
- Evaporator coil temperature sensor (T2)
- Indoor fan
- Indoor main PCB

Troubleshooting and repair:

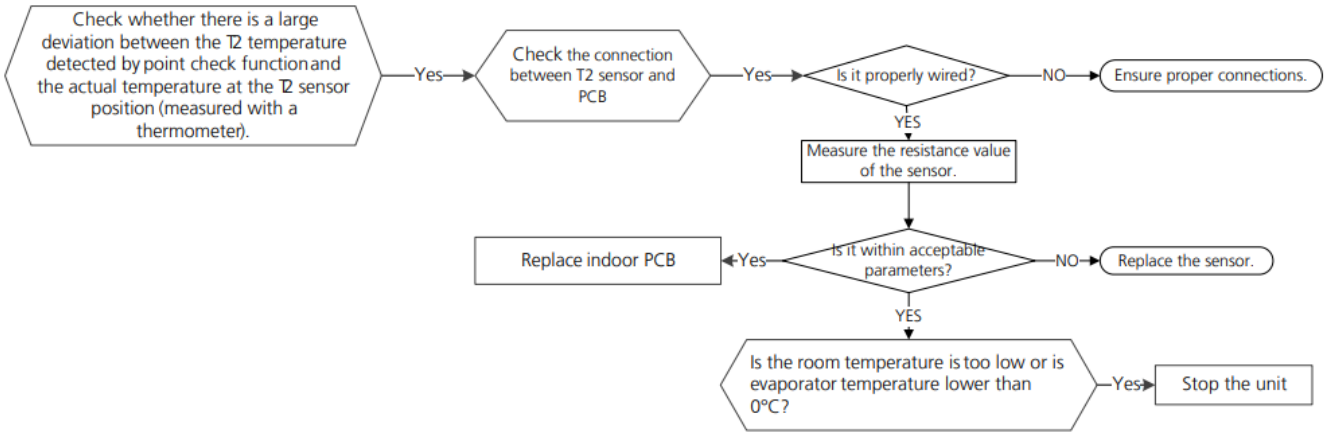


PH 91: Low temperature protection of evaporator diagnosis and solution

Description: When evaporator coil temperature is lower than 0°C in cooling mode or drying mode, the unit stops. It starts again only when the evaporator coil temperature is more than 5°C.

Recommended parts to prepare:

- Connection wires
- Evaporator coil temperature sensor (T2)
- Indoor main PCB



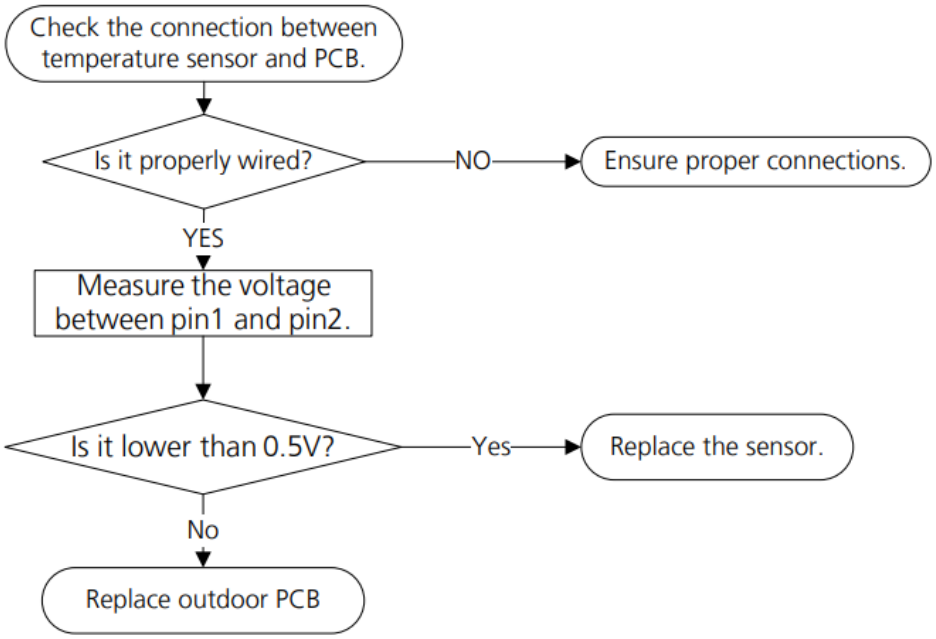
EC 5C: High pressure sensor is in open circuit or has short circuited diagnosis and solution

Description: If the sampling voltage is lower than 2V or higher than 254V, the LED displays the failure code.

Recommended parts to prepare:

- Connection wires
- Sensor
- Outdoor PCB

Troubleshooting and repair:



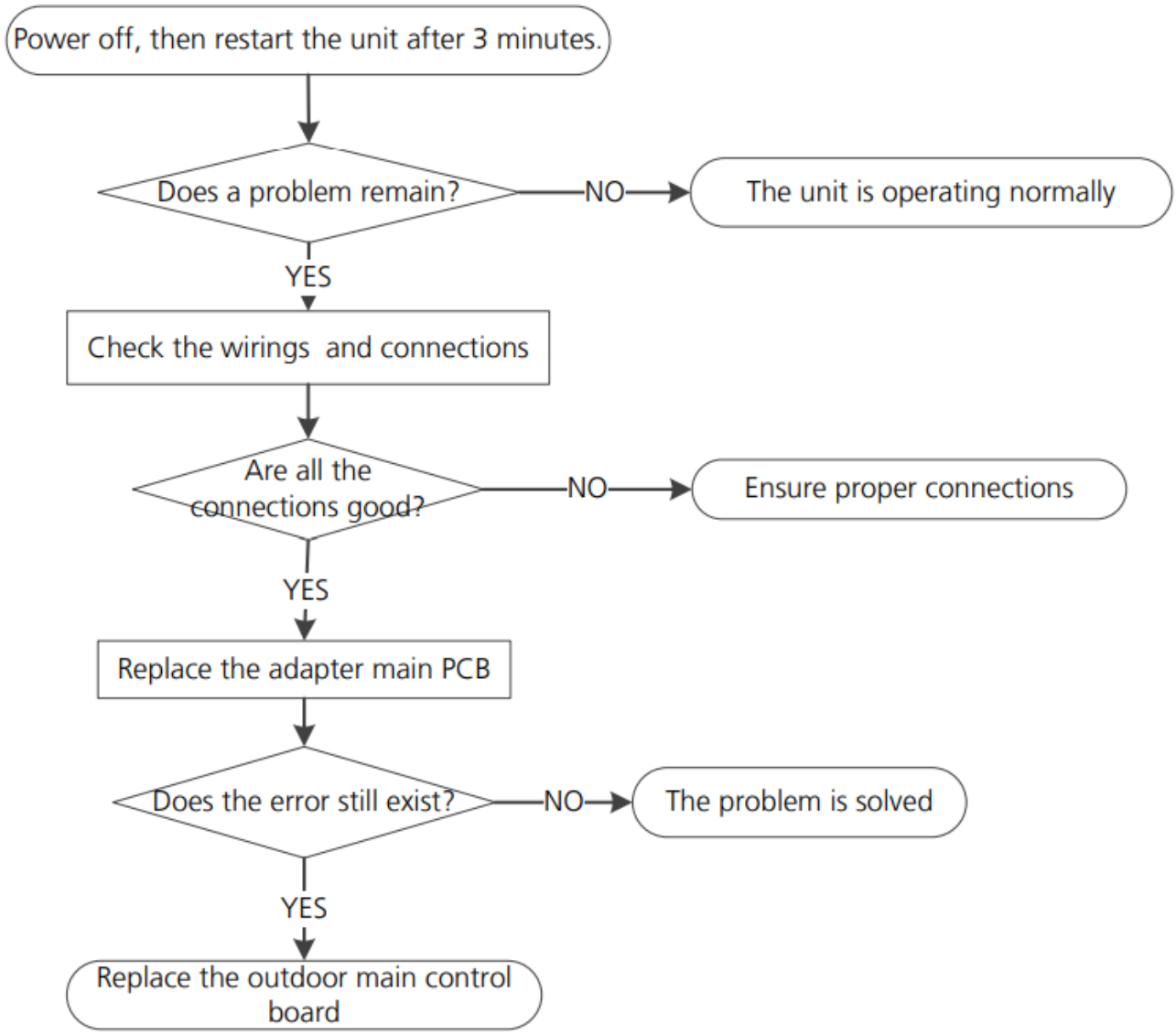
EL 16: Communication malfunction between adapter board and outdoor main board diagnosis and solution

Description: The adapter PCB cannot detect the main control board.

Recommended parts to prepare:

- Connection wires
- Adapter board
- Outdoor main PCB

Troubleshooting and repair:



4.6 Check Procedures

WARNING

Be sure to turn off all power supplies or disconnect all wires to avoid electric shock. Operate only after the compressor and coil has returned to normal temperature in case of injury.

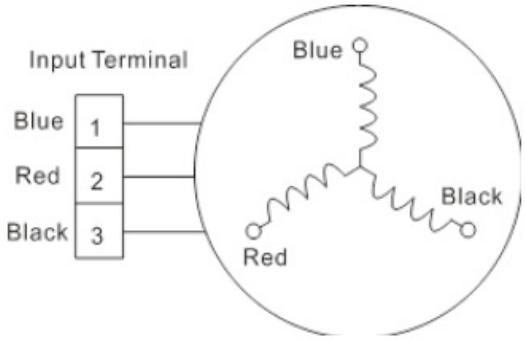
Temperature Sensor Check:

1. Disconnect the temperature sensor from the PCB.
2. Measure the resistance value of the sensor using a multi-meter.
3. Check corresponding temperature sensor resistance value table.

Note: The picture and the value are for reference only, actual condition and specific values may vary.

Compressor Check:

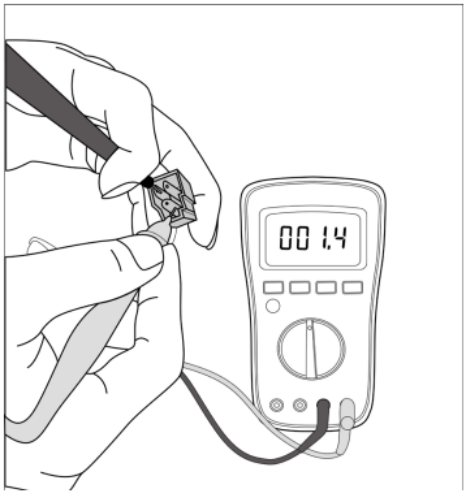
1. Disconnect the compressor power cord from the outdoor PCB.
2. Measure the resistance value of each winding using a multi-meter.
3. Check the resistance value of each winding in the following table.



Resistance Value	KSK103D33UEZ3	KSN140D58UFZ	KTF250D22UMT	KTN110D42UFZ	KTF420D62UNT
Blue-Red	2.13Ω	1.86Ω	0.75Ω	1.82Ω	0.86Ω
Blue-Black					
Red-Black					

Resistance Value	KTN150D30UFZA	KTM240D46UKT2	KTF310D43UMT	ETPQ420D1UMUA ETPQ440D1UMUB KTQ420D1UMU EKPQ440D1UMUB	MTH356UKRC8FQL
Blue-Red	1.02Ω	1.04Ω	0.65Ω	0.37Ω	0.487Ω
Blue-Black					
Red-Black					

Resistance Value	MTH550UKPC8FU				
Blue-Red	0.295Ω				
Blue-Black					
Red-Black					



Note: The picture and the value are for reference only, actual condition and specific values may vary.

IPM Continuity Check:

WARNING

Electricity remains in capacitors even when the power supply is off. Ensure the capacitors are fully discharged before troubleshooting.

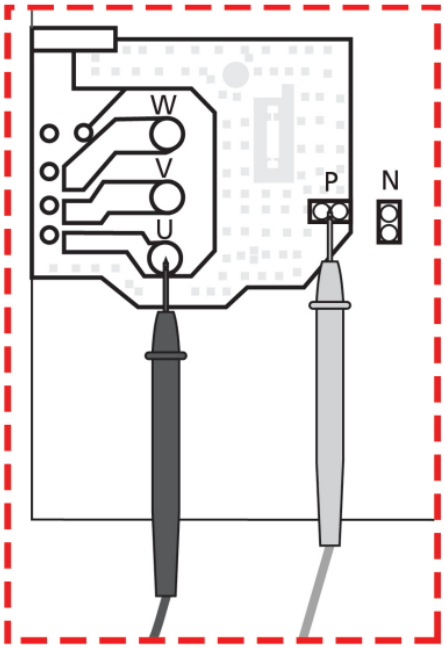
1. Turn off the outdoor unit and disconnect the power supply.
2. Discharge electronic capacitors and ensure all energy-storage units have been discharged.
3. Disassemble the outdoor PCB or disassemble the IPM board.
4. Measure the resistance value between P and U (U,W,N), U(V,W) and N.

Digital tester		Resistance Value	Digital Tester		Resistance Value
(+)Red	(-)Black		(+)Red	(-)Black	
P	N	∞ (Several Ω)	U	N	∞ (Several Ω)
	U		V		
	V		W		
	W		-		

Or Test the Conductivity of IPM with Diode Mode:

Needle-type Tester		Normal Value	Needle-Type Tester		Normal Value
Red	Black		Red	Black	
P	U	Open-Circuit	N	U	0.3-0.5V
	V			V	
	W			W	

Needle-type Tester		Normal Value	Needle-Type Tester		Normal Value
Red	Black		Red	Black	
P	U	0.3-0.5V	N	U	Open-Circuit
	V			V	
	W			W	



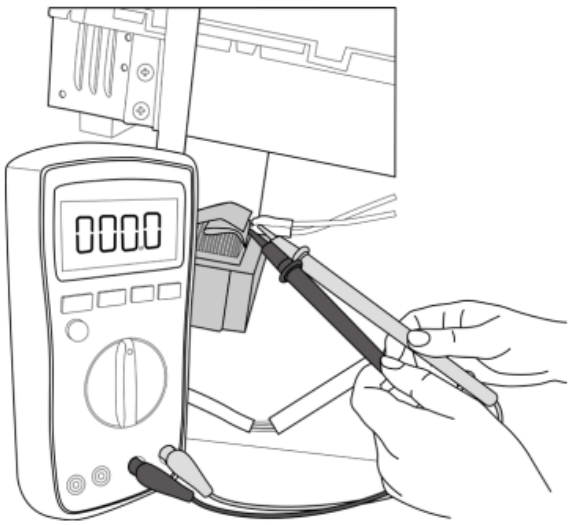
Note: The picture and the value are for reference only, actual condition and specific values may vary.

Normal voltage of P and N:

208-230V (1-Phase)		
In Standby		
Around 310VDC		
In Operation		
With passive PFC module	With partial active PFC module	With fully active PFC module
>200VDC	>310VDC	>370VDC

Reactor Check:

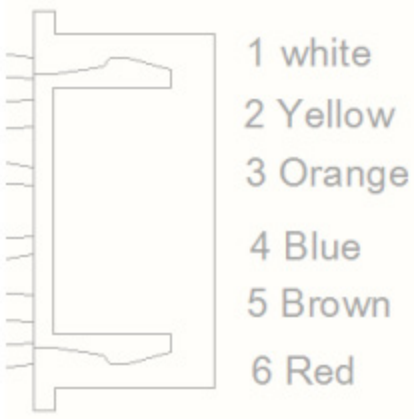
Measure the resistance and voltage (to ground) of the reactor. The normal resistance should be around 0.1 ohm. Otherwise the reactor has an issue.



4-Way Valve Check:

1. Power on and use a digital tester to measure the voltage. When the unit operates in cooling it is 0V, when the unit operates in heating it is about equal to the power supply voltage. (If the value of the voltage is not in range, the PCB must have problems and needs to be replaced.)
2. Turn off the power, use a digital tester to measure the resistance. The value should be 1.8~2.5KΩ.

EXV (EEV) Check:



1. Turn off outdoor unit and disconnect the power supply
2. Disconnect the connectors of EXV.
3. Measure the resistance value between Red and Blue(Yellow); Brown and Orange(White).

Resistance to EXV coil:

Color of Lead Winding	Normal Value
Red-Blue	About 50Ω
Red-Yellow	
Brown-Orange	
Brown-White	

5 TEMPERATURE SENSOR RESISTANCE TABLE

5.1 Temperature Sensor Resistance Value Table for TP (°C-K)

°C	°F	K Ohm	°C	°F	K Ohm	°C	°F	K Ohm	°C	°F	K Ohm
-20	-4	542.7	20	68	68.66	60	140	13.59	100	212	3.702
-19	-2	511.9	21	70	65.62	61	142	13.11	101	214	3.595
-18	0	483	22	72	62.73	62	144	12.65	102	216	3.492
-17	1	455.9	23	73	59.98	63	145	12.21	103	217	3.392
-16	3	430.5	24	75	57.37	64	147	11.79	104	219	3.296
-15	5	406.7	25	77	54.89	65	149	11.38	105	221	3.203
-14	7	384.3	26	79	52.53	66	151	10.99	106	223	3.113
-13	9	363.3	27	81	50.28	67	153	10.61	107	225	3.025
-12	10	343.6	28	82	48.14	68	154	10.25	108	226	2.941
-11	12	325.1	29	84	46.11	69	156	9.902	109	228	2.86
-10	14	307.7	30	86	44.17	70	158	9.569	110	230	2.781
-9	16	291.3	31	88	42.33	71	160	9.248	111	232	2.704
-8	18	275.9	32	90	40.57	72	162	8.94	112	234	2.63
-7	19	261.4	33	91	38.89	73	163	8.643	113	235	2.559
-6	21	247.8	34	93	37.3	74	165	8.358	114	237	2.489
-5	23	234.9	35	95	35.78	75	167	8.084	115	239	2.422
-4	25	222.8	36	97	34.32	76	169	7.82	116	241	2.357
-3	27	211.4	37	99	32.94	77	171	7.566	117	243	2.294
-2	28	200.7	38	100	31.62	78	172	7.321	118	244	2.233
-1	30	190.5	39	102	30.36	79	174	7.086	119	246	2.174
0	32	180.9	40	104	29.15	80	176	6.859	120	248	2.117
1	34	171.9	41	106	28	81	178	6.641	121	250	2.061
2	36	163.3	42	108	26.9	82	180	6.43	122	252	2.007
3	37	155.2	43	109	25.86	83	181	6.228	123	253	1.955
4	39	147.6	44	111	24.85	84	183	6.033	124	255	1.905
5	41	140.4	45	113	23.89	85	185	5.844	125	257	1.856
6	43	133.5	46	115	22.89	86	187	5.663	126	259	1.808
7	45	127.1	47	117	22.1	87	189	5.488	127	261	1.762
8	46	121	48	118	21.26	88	190	5.32	128	262	1.171
9	48	115.2	49	120	20.46	89	192	5.157	129	264	1.674
10	50	109.8	50	122	19.69	90	194	5	130	266	1.632
11	52	104.6	51	124	18.96	91	196	4.849			
12	54	99.69	52	126	18.26	92	198	4.703			
13	55	95.05	53	127	17.58	93	199	4.562			
14	57	90.66	54	129	16.94	94	201	4.426			
15	59	86.49	55	131	16.32	95	203	4.294			
16	61	82.54	56	133	15.73	96	205	4.167			
17	63	78.79	57	135	15.16	97	207	4.045			
18	64	75.24	58	136	14.62	98	208	3.927			
19	66	71.86	59	138	14.09	99	210	3.812			

Other Temperature Sensor Resistance Value Table (°C-K)

°C	°F	K Ohm	°C	°F	K Ohm	°C	°F	K Ohm	°C	°F	K Ohm
-20	-4	115.266	20	68	12.6431	60	140	2.35774	100	212	0.62973
-19	-2	108.146	21	70	12.0561	61	142	2.27249	101	214	0.61148
-18	0	101.517	22	72	11.5	62	144	2.19073	102	216	0.59386
-17	1	96.3423	23	73	10.9731	63	145	2.11241	103	217	0.57683
-16	3	89.5865	24	75	10.4736	64	147	2.03732	104	219	0.56038
-15	5	84.219	25	77	10	65	149	1.96532	105	221	0.54448
-14	7	79.311	26	79	9.55074	66	151	1.89627	106	223	0.52912
-13	9	74.536	27	81	9.12445	67	153	1.89627	107	225	0.51426
-12	10	70.1698	28	82	8.71983	68	154	1.83003	108	226	0.49989
-11	12	66.0898	29	84	8.3356	69	156	1.76647	109	228	0.486
-10	14	62.2756	30	86	7.97078	70	158	1.70547	110	230	0.47256
-9	16	58.7079	31	88	7.62411	71	160	1.64691	111	232	0.45957
-8	18	56.3694	32	90	7.29464	72	162	1.59068	112	234	0.44699
-7	19	52.2438	33	91	6.98142	73	163	1.53668	113	235	0.43482
-6	21	49.3161	34	93	6.68355	74	165	1.48481	114	237	0.42304
-5	23	46.5725	35	95	6.40021	75	167	1.43498	115	239	0.41164
-4	25	44	36	97	6.13059	76	169	1.38703	116	241	0.4006
-3	27	41.5878	37	99	5.87359	77	171	1.34105	117	243	0.38991
-2	28	39.8239	38	100	5.62961	78	172	1.29078	118	244	0.37956
-1	30	37.1988	39	102	5.3689	79	174	1.25423	119	246	0.36954
0	32	35.2024	40	104	5.17519	80	176	1.2133	120	248	0.35982
1	34	33.3269	41	106	4.96392	81	178	1.17393	121	250	0.35042
2	36	31.5635	42	108	4.76253	82	180	1.13604	122	252	0.3413
3	37	29.9058	43	109	4.5705	83	181	1.09958	123	253	0.33246
4	39	28.3459	44	111	4.38736	84	183	1.06448	124	255	0.3239
5	41	26.8778	45	113	4.21263	85	185	1.03069	125	257	0.31559
6	43	25.4954	46	115	4.04589	86	187	0.99815	126	259	0.30754
7	45	24.1932	47	117	3.88673	87	189	0.96681	127	261	0.29974
8	46	22.5662	48	118	3.73476	88	190	0.93662	128	262	0.29216
9	48	21.8094	49	120	3.58962	89	192	0.90753	129	264	0.28482
10	50	20.7184	50	122	3.45097	90	194	0.8795	130	266	0.2777
11	52	19.6891	51	124	3.31847	91	196	0.85248	131	268	0.27078
12	54	18.7177	52	126	3.19183	92	198	0.82643	132	270	0.26408
13	55	17.8005	53	127	3.07075	93	199	0.80132	133	271	0.25757
14	57	16.9341	54	129	2.95896	94	201	0.77709	134	273	0.25125
15	59	16.1156	55	131	2.84421	95	203	0.7537	135	275	0.24512
16	61	15.3418	56	133	2.73823	96	205	0.73119	136	277	0.23916
17	63	14.6181	57	135	2.63682	97	207	0.68844	137	279	0.23338
18	64	13.918	58	136	2.53973	98	208	0.66818	138	280	0.22776
19	66	13.2631	59	138	2.4467	99	210	0.64862	139	282	0.22231

6 SYSTEM PRESSURE TABLE

6.1 System Pressure Table-R454B

Pressure			Temperature		Pressure			Temperature	
Kpa	Bar	PSI	°C	°F	Kpa	Bar	PSI	°C	°F
58.196	0.58	8.44	-60	-76	935.23	9.35	135.64	8	46.4
61.517	0.62	8.92	-59	-74.2	963.75	9.64	139.78	9	48.2
64.988	0.65	9.43	-58	-72.4	992.93	9.93	14401	10	50
68.615	0.69	9.95	-57	-70.6	1022.8	10.23	148.34	11	51.8
72.402	.072	10.50	-56	-68.8	1053.3	10.53	152.76	12	53.6
76.354	0.76	11.07	-55	-67	1084.5	10.85	157.29	13	55.4
80.478	0.80	11.67	-54	-65.2	1116.4	11.16	161.91	14	57.2
84.776	0.85	12.30	-53	-63.4	1149	11.49	166.64	15	59
89.256	0.89	12.95	-52	-61.6	1182.3	11.82	171.47	16	60.8
93.923	0.94	13.62	-51	-59.8	1216.3	12.16	176.40	17	62.6
98.781	0.99	14.33	-50	-58	1251.1	12.51	181.45	18	64.4
103.84	1.04	15.06	-49	-56.2	1286.6	12.87	186.60	19	66.2
109.1	1.09	15.82	-48	-54.4	1322.8	13.23	191.85	20	68
114.56	1.15	16.61	-47	-52.6	1359.9	13.60	197.23	21	69.8
120.25	1.20	17.44	-46	-50.8	1397.7	13.98	202.71	22	71.6
126.15	1.26	18.30	-45	-49	1436.3	14.36	208.31	23	73.4
132.28	1.32	19.18	-44	-47.2	1475.7	14.76	214.02	24	75.2
138.64	1.39	20.11	-43	-45.4	1515.9	15.16	219.85	25	77
145.24	1.45	21.06	-42	-43.6	1557	15.57	225.82	26	78.8
152.09	1.52	22.06	-41	-41.8	1598.9	15.99	231.89	27	80.6
159.18	1.59	23.09	-40	-40	1641.6	16.42	238.09	28	82.4
166.54	1.67	24.15	-39	-38.2	1685.2	16.85	244.41	29	84.2
174.15	1.74	25.26	-38	-36.4	1729.7	17.30	250.86	30	86
182.04	1.82	26.40	-37	-34.6	1775	17.75	257.43	31	87.8
190.2	1.90	27.59	-36	-32.8	1821.3	18.21	264.15	32	89.6
198.65	1.99	28.81	-35	-31	1868.4	18.68	270.98	33	91.4
207.39	2.07	30.08	-34	-29.2	1916.5	19.17	277.95	34	93.2
216.42	2.16	31.39	-33	-27.4	1965.6	19.66	285.08	35	95
225.76	2.26	32.74	-32	-25.6	2015.5	20.16	292.31	36	96.8
235.41	2.35	34.14	-31	-23.8	2066.5	20.67	299.71	37	98.6
245.37	2.45	35.59	-30	-22	2118.4	21.18	307.24	38	100.4
255.67	2.56	37.08	-29	-20.2	2171.3	21.71	314.19	39	102.2
266.29	2.66	38.62	-28	-18.4	2225.2	22.25	322.73	40	104
277.25	2.77	40.21	-27	-16.6	2280.2	22.80	330.70	41	105.8
288.56	2.89	41.85	-26	-14.8	2336.1	23.36	38.81	42	107.6
300.22	3.00	43.54	-25	-13	2393.2	23.93	347.09	43	109.4
312.24	3.12	45.28	-24	-11.2	2451.3	24.51	355.52	44	111.2
324.63	3.25	47.08	-23	-9.4	2510.4	25.10	364.09	45	113
337.39	3.37	48.93	-22	-7.6	2570.7	25.71	372.84	46	114.8
350.54	3.51	50.84	-21	-5.8	2632.1	26.32	381.74	47	116.6
364.08	3.64	52.80	-20	-4	2694.7	26.95	390.82	48	118.4
378.02	3.78	54.83	-19	-2.2	2758.33	27.58	400.04	49	120.2
392.37	3.92	56.91	-18	-0.4	2823.2	28.23	409.46	50	122
407.13	4.07	59.05	-17	1.4	2889.3	28.89	419.04	51	123.8

System Pressure Table-R454B Cont.

Pressure			Temperature		Pressure			Temperature	
Kpa	Bar	PSI	°C	°F	Kpa	Bar	PSI	°C	°F
422.31	4.22	61.25	-16	3.2	2956.5	29.57	428.79	52	125.6
437.92	4.38	63.5	-15	5	3025	30.25	438.72	53	127.4
453.98	4.54	65.84	-14	6.8	3094.7	30.95	448.83	54	129.2
470.47	4.70	68.23	-13	8.6	3165.7	31.66	459.13	55	131
487.43	4.87	70.69	-12	10.4	3238.1	32.38	469.63	56	132.8
504.84	5.05	73.22	-11	12.2	3311.7	33.12	480.30	57	134.6
522.73	5.23	75.81	-10	14	3386.7	33.87	491.18	58	136.4
541.1	5.41	78.48	-9	15.8	3463	34.63	502.25	59	138.2
559.95	5.60	81.21	-8	17.6	3540.7	35.41	513.52	60	140
579.31	5.79	84.02	-7	19.4	3619.9	36.20	525.00	61	141.8
599.16	5.99	86.90	-6	21.2	3700.5	37.01	536.69	62	143.6
619.54	6.20	89.85	-5	23	3782.7	37.83	548.61	63	145.4
640.43	6.40	92.88	-4	24.8	3866.3	38.66	560.74	64	147.2
661.86	6.62	95.99	-3	26.6	3951.5	39.52	573.10	65	149
683.82	6.84	99.18	-2	28.4	4038.3	40.38	585.69	66	450.28
706.34	7.06	102.44	-1	30.2	4126.8	41.27	598.52	67	152.6
729.41	7.29	105.79	0	32	4217	42.17	611.60	68	154.4
753.06	7.53	109.22	1	33.8	4309	43.09	624.95	69	156.2
777.28	7.77	112.73	2	35.6	4402.9	44.03	638.56	70	158
802.08	8.02	116.33	3	37.4	4498.7	44.99	652.46	71	159.8
827.47	8.27	120.01	4	39.2	4596.5	45.97	666.64	72	161.6
853.49	8.53	123.78	5	41	4696.5	46.97	681.15	73	163.4
880.11	8.80	127.64	6	42.8	4798.9	47.99	696.00	74	165.5
907.35	9.07	131.60	7	44.6	4904.1	49.04	711.25	75	167

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